قسم هندسة الغاز الطبيعي

➢ المرفقات:

- توصيف البرنامج.
- مصفوفة البرامج.
- مجالس تبني المعايير الأكاديمية:
  1. مجلس قسم هندسة الغاز الطبيعي لتبني المعايير الأكاديمية **NARS 2018**.
  2. اعتماد توصيف البرنامج والمقررات من مجلس القسم.
  3. مجلس الكلية لتبني المعايير الأكاديمية **NARS 2018** لكل الأقسام العلمية.
  4. مجلس الجامعة لتبني المعايير لكل الأقسام.
- توصيف المقررات.

Port Said University

وحدة ضمان الجودة والاعتماد
كلية الهندسة ببورسعيد

PORT SAID UNIVERSITY
FACULTY OF ENGINEERING

توصيف البرنامج

Natural Gas Engineering Program (NGEP)

Port Said University **Faculty of Engineering at Port-Said**

Program Specifications

A- Basic Information

1- Program Title: **Natural Engineering Program**

2- Program Type: Single ▨ Double ☐ Multiple ☐

3- Department: Chemical Engineering

4- Coordinator: Prof. Mohamed Bassyouni
5- External Evaluator(s): Prof. Atteyah Mahmoud

6- Last date of program specifications approval: 2021

1- Program Aims

The high demand for trained natural gas engineers is projected to remain well into the 21st century. Therefore, the faculty offers the natural gas engineering program to meet the market needs for engineers. Natural gas engineering program at the faculty of engineering is concerned with the graduation of the students to be engineers in the field of natural gas engineering and its applications. As well as, the main target is to promote qualified engineers in the program field.

After completing the program, the graduate will be able to:

1) Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve engineering problems in real life.
2) Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles.
3) Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.
4) Use techniques, skills, and modern engineering tools necessary for engineering practice.
5) Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages to deal with academic/professional challenges in a critical and creative manner.
6) Act professionally in design and supervision of natural gas operations
7) Apply analytical, experimental, design, natural gas engineering processes with proficiency aided by modern engineering tools.
8) Use the modern technologies and material safety data sheets while designing and handling natural gas projects
9) Lead, manage, supervise a group of process and operational engineers, and apply common practice in natural gas industry to meet society's requirements of occupational health, safety, and quality standards.

2) Graduate attributes with program aim:

	Program aims:	Graduate attributes
Attributes of Engineer	1) Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve engineering problems in real life.	1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations.
		2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.
	2) Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles.	3. Behave professionally and adhere to engineering ethics and standards
		5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community.
		6. Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
	3) Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.	4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
		10. Demonstrate leadership qualities, business administration and entrepreneurial skills.
	4) Use techniques, skills, and modern engineering tools necessary for engineering practice.	7. Use techniques, skills, and modern engineering tools necessary for engineering Practice.

	5) Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages to deal with academic/professional challenges in a critical and creative manner.	8. Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.
		9. Communicate effectively using different modes, tools, and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.
Attributes of chemical engineering	6) Act professionally in design and supervision of natural gas operations	11. merge the chemical, mechanical and petroleum engineering knowledge, understanding, and feedback to improve design, products and/or services involved in natural gas industry
		12. Identify major problems and conduct troubleshooting in natural gas processing plants.
	7) Apply analytical, experimental, design, natural gas engineering processes with proficiency aided by modern engineering tools	13. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.
		14. Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.
	8) Use the modern technologies and material safety data sheets while designing and handling natural gas projects	15. Demonstrate a comprehensive understanding of design methodologies related to natural gas engineering and apply and adapt them to unfamiliar situations with special consideration given to state-of-the-art technologies

		16. Undertake the safe handling of petroleum materials taking into account their physical and chemical properties, including risk assessment of any specific hazards associated with their use.
	9) Lead, manage, supervise a group of process and operational engineers, and apply common practice in natural gas industry to meet society's requirements of occupational health, safety, and quality standards.	17. Lead, manage, supervise a group of process and operational engineers, and apply best practice in natural gas industry to meet society's requirements of occupational health, safety, and quality standards.

3. The Academic Reference NARS 2018

3.1. Competencies for Engineering Graduates (A-Level)

The Engineering Graduate must be able to:

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics

A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.

A5. Practice research techniques and methods of investigation as an inherent part of learning.

A6. Plan, supervise and monitor implementation of engineering projects.

A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.

A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.

A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

3.2. Competencies (D-Level)

D1 Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Measurements, and Mechanical Design.

D2. Demonstrate knowledge, understanding, and utilization of plane and topographical surveying techniques, processes and equipment, photogrammetry and the Global Positioning system (GPS) in engineering projects.

D3. Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.

D4. Demonstrate additional abilities to select appropriate system, analyze, and design using the most up-to-date analytical tools, techniques, equipment, and software packages.

D5. Demonstrate basic organizational and project management skills.

D6. Prepare and present technical language and report writing.

D7. Apply numerical modeling methods and/or computational techniques.

D8. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.

D9. Exchange knowledge and skills with engineering community and industry.

D10. Incorporate economic, societal, environmental dimensions and risk management in design.

D11. Practice the neatness and aesthetics in design and approach.

D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and Apply quality assurance procedures and follow codes and standards.

D13. Analyze geological data, interpret well-logs, estimate hydrocarbon reserves and evaluate reservoir performance by applying the principles and basic concepts of: geology, geophysics and reservoir engineering.

D14. Plan and construct oil wells, develop oilfield production programs, design early surface facilities plants and field evacuation plans by applying the principles and basic concepts of: drilling engineering, production engineering, phase equilibrium, fluid mechanics and flow through porous media.

D15. Use specialist computer applications and mathematical models to maximize the performance of all Natural gas engineering stages.

D16. Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer.

D17. Select appropriate solutions for engineering problems and enhanced gas recovery based on analytical thinking and Select appropriate mathematical and computer-based methods for modeling and analyzing problems.

D18. Evaluate and appraise designs, processes (operations), equipment and machinery, and propose improvements.

D19. Analyze and interpret data related to well logs and testing, and design experiments to obtain new data.

D20. Create and/or re-design a process, component or system, and carry out specialized engineering designs related to gas reservoir and well drilling and completion.

D21. Conduct troubleshooting in natural gas processing plants.

D22. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services in natural gas processing and applications.

4- The Academic Reference ARS 2018 and Program Aims

Program aims	Academic Reference LO's
1. Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve engineering problems in real life.	A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. D1 Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and

	mass transfer, Material Properties, Measurements, and Mechanical Design. D8. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.
2. Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles.	A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. D9. Exchange knowledge and skills with engineering community and industry.
3. Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.	A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams. A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. D5. Demonstrate basic organizational and project management skills.
4. Use techniques, skills, and modern engineering tools necessary for engineering practice.	D2. Demonstrate knowledge, understanding, and utilization of plane and topographical

	surveying techniques, processes and equipment, photogrammetry and the Global Positioning system (GPS) in engineering projects. D7. Apply numerical modeling methods and/or computational techniques. D13. Analyze geological data, interpret well-logs, estimate hydrocarbon reserves and evaluate reservoir performance by applying the principles and basic concepts of: geology, geophysics and reservoir engineering.
5. Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages to deal with academic/professional challenges in a critical and creative manner.	A5. Practice research techniques and methods of investigation as an inherent part of learning. A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. D6. Prepare and present technical language and report writing.
6. Act professionally in design and supervision of natural gas operations	D11. Practice the neatness and aesthetics in design and approach. D14. Plan and construct oil wells, develop oilfield production programs, design early surface facilities plants and field evacuation plans by applying the principles and

	basic concepts of: drilling engineering, production engineering, phase equilibrium, fluid mechanics and flow through porous media. D16. Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer. D18. Evaluate and appraise designs, processes (operations), equipment and machinery, and propose improvements. D21. Conduct troubleshooting in natural gas processing plants. D22. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services in natural gas processing and applications.
7. Apply analytical, experimental, design, natural gas engineering processes with proficiency aided by modern engineering tools	A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. D3. Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.

	D4. Demonstrate additional abilities to select appropriate system, analyze, and design using the most up-to-date analytical tools, techniques, equipment, and software packages. D17. Select appropriate solutions for engineering problems and enhanced gas recovery based on analytical thinking and Select appropriate mathematical and computer-based methods for modeling and analyzing problems. D19. Analyze and interpret data related to well logs and testing, and design experiments to obtain new data.
8. Use the modern technologies and material safety data sheets while designing and handling natural gas projects	A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. D15. Use specialist computer applications and mathematical models to maximize the performance of all Natural gas engineering stages. D20. Create and/or re-design a process, component or system, and carry out specialized engineering designs related to gas reservoir and well drilling and completion.

9. Lead, manage, supervise a group of process and operational engineers, and apply common practice in natural gas industry to meet society's requirements of occupational health, safety, and quality standards.	A6. Plan, supervise and monitor implementation of engineering projects. D10. Incorporate economic, societal, environmental dimensions and risk management in design. D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and Apply quality assurance procedures and follow codes and standards.

5- Academic standards

External references for standards (Benchmarks)

The external references for standards considered in the development of this program were the National Academic Reference Standards for Engineering (NARS 2018) for Petroleum, Petrochemical and chemical Engineering graduate.

Comparison of Provision to External References

Component	**NARS %**	**Program Benchmarks %**
Basic Sciences	21	20.23
Humanities	11	10.28
Engineering Science	21	26
Specialization and electives	21	26
Computing and IT	10	5
Projects	9	5
Subtotal	93	92.5
Discretionary to reach at least the minimum total	7	7.5

6- Curriculum Structure and Contents

4.a- Program duration: 173 credit hours.

4.b- Program structure

4.b.i- No. of hours per week: Lectures -- Lab./Exercise -- total 18 cr

4.b.ii- No. of credit hours: 175 Compulsory 137 Elective 38 Optional ==

4.b.iii-No. of credit hours of basic sciences courses: No. 35 % 20.3

4.b.iv- No. of credit hours of courses of social sciences and humanities: No. 18 % 10.4

4.b.v- No. of credit hours of specialized (elective) courses: No. 30 % 17.3

4.b.vi- No. of credit hours of engineering courses: No. 90 % 52

4.b.vii Practical/Field Training: field training duration depends on the company training plan

4.b.viii-Program Levels (in credit-hours system): ***Freshman (34 credit hours)***
Sophomore (37 credit hours)
Junior (33 credit hours)
Senior I (36 credit hours)
Senior II (35 credit hours)

7- Program Courses

Preparatory Year (Freshman)

First Semester

Course Code		**Course Title**	**Credit Hours**				**Program ILOs Covered (By No.)**
Code	No.		**Lecture**	**Tutorial**	**Lab**	**Total**	
BSM	011	Physics I	3	-	3	**4**	A1,A2,D3
BSM	022	Production Technology	2	-	6	**4**	A1,A2,A4,D3
BSM	013	Mathematics I	2	2	-	**3**	A1,A2
BSM	014	Mechanics I	2	2	-	**3**	A1,A5,D1
HUM	092	Technical English Language I	2	-	-	**2**	A7,A8,D6

Second Semester

BSM	021	Engineering Drawing and Projection	2	2	3	**4**	A1,A3,A8
BSM	012	General Chemistry	2	-	3	**3**	A1,A2,D3
BSM	025	Computers	2	-	3	**3**	A1,A3,A5,D4
BSM	024	Mechanics II	2	2	-	**3**	A1,A2
BSM	023	Mathematics II	2	2	-	**3**	A1,A5,D1
HUM	091	History of Engineering	2	-	-	**2**	A7,A9,A10
Total			23	10	18	**34**	

First Year (Sophomore)

First Semester

Course Code		**Course Title**	**Credit Hours**				**Program ILOs Covered (By No.)**
Code	No.		Lecture	Tutorial	Lab.	Total	
BSM	111	Physics II	3	-	3	**4**	A1,A2,D3
BSM	112	Applied statistics and probability theory	2	2	-	**3**	A1,A2
BSM	113	Numerical Analysis	2	-	3	**3**	A1,A2
NGP	111	Physical and Organic Chemistry	2	-	3	**3**	A2,D3
BSM	115	Properties and strength of materials	2	-	3	**3**	A1,A2,D3
HUM	191	Technical English language II	2	-	-	**2**	A1,A2

Second Semester

NGP	121	General Geology	2	-	3	**3**	A1,A2,A4,A5,D2
NGP	122	Introduction to Oil and Gas Engineering	2	2	-	**3**	A1,D3,D11,D18
BSM	121	Computers and Programming	2	-	6	**4**	A1,A3,A5
NGP	123	Drawing & Elements of Machine Design	2	2	3	**4**	A1,D3,D11,D18
BSM	123	Fluid Mechanics	2	-	3	**3**	A1,A3,A5
HUM	192	Human Rights	2	-	-	**2**	A4,D16
Total			25	8	27	**37**	

Second Year (Junior)

First Semester

Course Code		Course Title	Credit Hours				Program ILOs Covered (By No.)
Code	No.		Lec.	Tut.	Lab.	Total	
NGP	211	Petroleum Geology	2	-	3	3	A1,A2,A4,A5,D13
BSM	211	Differential Equations	2	2	-	3	A5,D1,D7
BSM	212	Computer Applications	2	-	3	3	A1,A2
BSM	213	Thermodynamics	2	-	3	3	A1,A3,A5,D4
HUM	291	Technical English.3(Report Writing)	1	-	3	2	A8,A9,A10,D6

Second Semester

NGP	221	Natural Gas Fluid Properties	3	2	-	4	A5,D1,D7
NGP	222	Well Drilling & Completion	3	2	-	4	A1,D15
NGP	223	Natural Gas Production Engineering I	2	2	-	3	A4,D1,D15
BSM	221	Electrical Engineering and Electronics	2	-	3	3	A1,A2,A4,D1
BSM	222	Plane Surveying & Topography	2	-	3	3	A1,A2,D1,D2,D3
HUM Human	292	Engineering Economics	2	-	-	2	A3,A6,A9,D3
	294	Management and Marketing					A7,A9,A10,D5
Total			23	8	18	33	

Third Year (Senior I)

First Semester

Course Code		**Course Title**	**Credit Hours**				**Program ILOs Covered (By No.)**
Code	No.		Lec.	Tut.	Lab.	Total	
NGP	311	Heat Transfer and Heat Exchanger	2	2	3	**4**	A2,A10,D1,D9,D11
NGP	312	Multiphase Flow	3	2	--	**4**	A4,A6,D1,D8
NGP	313	Gas Reservoir Engineering	2	2	--	**3**	A1,A2,D13,D17,D20
NGP	314	Gas Turbo-machinery	3	2	--	**4**	A1,A2,D1,D4
HUM39X Student selects only one course:	391	Environment & Society Services	2	--	--	**2**	A4,A7,A9
	392	Management Science I: Determination Decision Models	2	--	--	**2**	A5,A7,A8,D5

Second Semester

NGP	321	Gas Process Engineering	3	2	--	**4**	A3,A4,A7,D8,D16,D21
NGP	322	Energy Resources	3	2	--	**4**	A3,A4,D1,D16
NGP6XX Student selects only three course:	601	Well Logging	2	2	--	**3**	A2,D4,D12,D19
	602	Oil and Gas Legal Framework	2	2	--	**3**	A4,A5,D9,D10,D12,D16
	603	Offshore Technology	2	2	--	**3**	A3,A4,D13,D14,D20
	604	N.G Engineering Production II	2	2	--	**3**	A4,D1,D15
	605	Material aspect for Gas Production	2	2	--	**3**	A4,D1,D12

HUM39X Student selects only one course:	393	Eng Ethics & Communications.	2	--	--	**2**	A7,A8,A9,A10
	394	International Relations	2	-	-	**2**	A7,A8,A9.A10
Total			26	18	3	**36**	

Fourth Year (Senior II)

First Semester

Course Code		**Course Title**	**Credit Hours**				**Program ILOs Covered (By No.)**
Code	No.		Lec.	Tut.	Lab.	Total	
NGP	411	Fuel Science & Technology	3	2	--	4	A3,A5,D1,D16
NGP	412	Natural Gas Transmission	3	2	--	4	A3,A4,D10,D12,D16
NGP 7XX Student selects only TWO course	701	Well Testing,	2	2	--	3	A2,D3,D9,D12
	702	Gas Process simulation					A2,D3,D7,D15,D21
	703	Flow in Porous Media					A2,A4,A13,A17,A20
	704	Advanced Well Drilling Engineering,					A1,D14,D20
	705	Quality Control of N.G Production					A4,D12
	706	Liquefaction of Natural Gas					A4,D15,D16
	707	Natural Gas Derivatives					A1,A5,A10,D9,D22
	708	Natural Gas Applications,					A3,D7,D15,D16,D22
	709	N .G & Liquefied N.G. Vehicles					A4,D9,D16
HUM49X Student selects only one course:	491	Scientific Thought,	2	--	--	2	A5,A7,A9,A10
	492	Management Science II: Risk Analysis					A5,A7,A8
	493	Leadership in Groups & Organizations,					A6,A7,A8,A9
NGP	499	Senior Design Project	--	6	--	3	A6, A7, A8, A9, A10, D2, D4, D5, D7, D18, D19, D20, D22

Second Semester

NGP	421	N. G.s Pipeline network	3	2	--	4	A4, D1, D11, D12
NGP 7XX Student selects only	710	Environmental Engineering for Natural Gas sector	2	2	--	3	A3,A4,D10,D12,D16
	711	Natural Gas Field Safety					A6,A7,D12,D21
	712	Production Equipment					A2,A3,D14,D17,D18
	713	Enhanced Gas Recovery					A2,D13,D14,D17
	714	Natural Gas Industry Economics					A3,D10
	715	Integrated Reservoir Management,					A1,A3,D1,D8,D19

THREE course	716	Investment Management,					A6,A8,A9,A10,D5
	717	Subsea Technology					A1,D13,D14,D20
	718	Under balanced Drilling and Completions					A1,D14,D20
NGP	499	Senior Design Project	0	6	--	3	A6, A7, A8, A9, A10, D2, D4, D5, D7, D18, D19, D20, D22
Total			21	28	**--**	**35**	

8- Program Admission and Transfer Requirements

The normal minimum entrance qualification for admission to this program is the General Secondary Certificate or its equivalent, according to article (75) of The Universities Coordinating Rules and the student option. All students should take at least 75% of their course work within the program.

Applicants who have attempted other undergraduate studies must submit official academic transcripts, mark sheets, and/or certificates from the faculty attended regardless of whether they have earned credit or seek transfer credit. Students who withdraw from the University in good standing and subsequently wish to return after an absence of one or more semesters may apply for re-admission. Re-admission is offered on a space-available basis and is not guaranteed.

Transfer from and to the new programs is allowed after equating the courses and not after the third level (a minimum of two years should be accomplished within the program) and with a maximum of 50% of the credit hours; Faculty permission is a must.

9- Regulations for Progression, Program Completion & Student Assessment Methods

9.1 Graduation

To be awarded the B.Sc. degree students must complete 175 credit hours, in courses with grades of "D" or better and earn a grade-point average of "C" or better, both overall and in the specialization field. This means that a minimum 2.0 overall and in-major (GPA) is required for graduation.

9.2 Academic duration and schedule:

The total period required may consist of 10 semesters for all students. The scholar year is divided into 2 semesters ending by an examination according to the schedule of the courses as enclosed. The academic year involves 3 semesters:

- Fall semester (first semester) starting from the third week in September for 15 weeks.
- Spring semester (second semester) starting from the second week in February for 15 weeks.
- Summer semester starting from the first week in July for 8 weeks.

The registration is to be done before each semester.

9.3 Conditions and number of registration hours

The number of credit hours in which the student registers in the main semester is not to be less than 12 credit hours, and not more than 21 credit hours, so that the maximum credit hours that the student records in one semester are to be as follows:

- 21 credit hours for students with a semester average greater than or equal to 3.3.
- 18 credit hours for students with a semester average greater than or equal to 2.0.
- 14 credit hours for students with a semester average less than 2.0.

For the summer semester, the hours for courses in which registration is not to be more than 8 credit hours (two academic courses only), and a third course may be added after approval by the managing committee based on the student's desire to register and the recommendation of the academic advisor and the accreditation of the College Council.

9.4 Examinations and Assessment

At the end of the semester, students are evaluated throughout a written examination in each registered course. Dropped courses are not considered. The student is prohibited from entering the exam if he does not fulfill the required conditions of presence in classes, tutorials and labs. This is according to a statement from the Faculty Council if he achieves a percentage less than 75% of the total contact hours. In this case, a grade of "F" is given in those courses.

9.5 Transcripts

Students who have graduated or who withdraw from the university in good standing are entitled to one free student transcript of their academic record. No transcript of academic record will be issued during the examination, registration, or graduation periods. Academic transcripts will not be issued when unsatisfied financial obligations to the university exist.

10-Teaching and Learning Methods

- Lecture (online/ in class)
- Interactive lectures
- Flipped Classroom
- Presentation
- Discussion
- Problem-solving
- Brain storming
- Projects
- Site visits
- Self-learning
- Cooperative
- Drawing Studio
- Computer Simulation
- Practical Experiments

11-Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

12-Evaluation methods of students

No.	Method
1	Mid Term Examination (written/ online)
2	Practical/ Oral Examination
3	Formative (quizzes- online quizzes- presentation - …….)
4	Final Term Examination (written)
5	Graduation Project

13-Evaluation of program learning outcomes

Evaluator	Tool	Sample
1- Senior students	Meeting + questionnaire	10
2- Alumni	questionnaire	15
3- Stakeholders (Employers)	Site visits	8
4-External Evaluator(s) (External Examiner (s)	Evaluation report	3
5- Other	---------	------

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date: 28 /3/28

مصفوفة البرنامج

Natural Gas Engineering Program--NARS 2018 Competency Matrix-- Acadimic Year 2019-2020

	Code No.	Course Title	A-Level										D-Level																					
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	D18	D19	D20	D21	D22
Preparatory Year (Freshman)	BSM 011	Physics I	X	X																														
	BSM 012	General Chemistry	X	X																														
	BSM 013	Mathematics I	X	X																														
	BSM 014	Mechanics I	X	X																														
	BSM 021	Engineering Drawing and Projection	X		X							X																						
	BSM 022	Production Technology	X	X		X																												
	BSM 023	Mathematics II	X	X																														
	BSM 024	Mechanics II	X	X																														
	BSM 025	Computers	X		X							X																						
	HUM 091	History of Engineering							X		X	X																						
	HUM 092	Technical English I							X	X																								
First Level (Sophomore)	NGP111	Physical and Organic Chemistry		X											x																			
	BSM 111	Physics II	X	X																														
	BSM 112	Applied statistics and probability theory	X	X																														
	BSM 113	Numerical Analysis	X	X																														
	BSM 115	Properties and strength of materials	X	X									x																					
	HUM 191	Technical English II							x	x								x																
	NGP 121	General Geology	x	x		x	x							X																				
	NGP 123	Drawing and Elements of Machine Design	X												x								x							x				
	BSM 121	Computers and Programming	x		x		x									x																		
	NGP 122	Introduction to oil and Gas Engineering				X																						x						
	BSM 123	Fluid Mechanics	X										X		X																			
	HUM 192	Human Rights								x	x	x																						
Second Year (Junior)	NGP 211	Petroleum Geology	x	x		x	x																		x									
	NGP 221	Natural Gas Fluid Properties					X						x						X															
	BSM 211	Differential Equations	X	X																														
	BSM 212	Computer Applications	X		X		X									X																		
	BSM 213	Thermodynamics	X		X								X																					
	HUM 291	Technical English Language III (Report Writing)								X	X	X						X																
	NGP 222	Well Drilling & Completion	X																							x						x		
	NGP 223	Natural Gas Production Engineering				X							x														x							
	BSM 221	Electrical Engineering and Electronics	X	X		X										x																		
	BSM 222	Plane Surveying & Topography	X	X									X	X	X																			
	HUM 29X Humanity Elective (1)	HUM 292 Engineering economics			X			X			X						x																	
		HUM 294 management and Marketing							X		X	X					X																	
Third Year (Senior I)	NGP 311	Heat transfer and Heat Exchanger		X								X	x								x		x											
	NGP312	Multiphase Flow				X		X					x							x														
	NGP 313	Gas Reservoir Engineering	X	X																					x				x			x		
	NGP 314	Gas Turbomachinery	X	X									x			x																		
	NGP 321	Gas Process Engineering			x	x			x											X								X					X	
	NGP 322	Energy Resources			x	x							X															X						
	NGP 6XX Elective (1-2-3)	NGP 601 Well Logging		x												X								X						X				
		NGP 602 Oil and Gas Legal Framework				x	x														X	X		X				X						
		NGP 603 Offshore technology			x	x																			X	X						X		
		NGP 604 Natural Gas Engineering Production II				x							x														x							
		NGP 605 Material aspect for Gas Production				x							X											X										
	HUM 39X Humanity Elective (2),(3)	HUM 391 Environment and Society Services				X			X		X																							
		HUM 392 Management Science I: Determination Decision Models					X		X	X							X																	
		HUM 393 Engineering Ethics and Communications							X	X	X																							
		HUM 394 International Relations							X	X	X	X																						
Fourth Year (Senior II)	NGP 411	Fuel Science and Technology			x		x						X															X						
	NGP412	Natural Gas Transmission			x	x																X		X				X						
	NGP421	Natural Gas Pipeline Networks				x							X										X	X										
	NGP499	Senior Project						x	x	x	x	x		x		X	x		x											x	X	x		X
	NGP 7XX Elective (4-5-6-7-8)	NGP701 Well Testing		x											x						x			x										
		NGP702 Gas Process simulation		x											X				X								X						x	
		NGP703 Flow in Porous Media		X		X																			X				X			X		
		NGP704 Advanced Well Drilling Engineering	X																							X						X		
		NGP705 Quality Control of Natural Gas Production				x																		X										
		NGP706 Liquefaction of Natural Gas				x																					X	X						
		NGP707 Natural Gas Derivatives	x				x					x									X													X
		NGP708 Natural Gas Applications			x														X								X	X						x
		NGP709 Natural Gas & Liquefied Natural Gas Vehicles				x																x						X						
		NGP710 Environmental Engineering for Natural Gas sector			x	x																X		X										
		NGP711 Natural Gas Field Safety						x	x															X									X	
		NGP712 Production Equipments		x	x																					X			X	x				
		NGP713 Enhanced Gas Recovery		x																					X	X			X					
		NGP714 Natural Gas Industry Economics			x							x										X												
		NGP715 Integrated Reservoir Management	X		X								X				X			X											X			
		NGP716 Investment Management						x		x	x	x					X																	
		NGP717 Subsea Technology	X																						X	X						X		
		NGP718 Under balanced Drilling and Completions	X																							X						X		
	HUM 49X Humanities Elective (4)	HUM 491 Scientific Thought					X		X	X	X																							
		HUM 492 Management Science II					X		X	X							X																	
		HUM 493 Leadership in Groups & Organizations						X	X	X	X						X																	

مجالس تبني المعايير الأكاديمية

CEP
CONSTRUCTION ENGINEERING PROGRAM

جامعة بورسعيد
كلية الهندسة
إدارة البرامج الجديدة
إدارة البرامج الجديدة

NGEP
Natural Gas Engineering Program

محضر اجتماع اللجنه الفرعية للبرامج الجديدة

لشهرفبراير للعام الجامعي ٢٠٢٠/٢٠٢١

اجتمعت اللجنه الفرعيه لتسيير أعمال البرامج الجديده يوم الأحد الموافق٢٠٢١/٢/٢٨م وذلك فى تمام الساعة العاشرة صباحا برئاسة السيد الأستاذ الدكتور/ **حسن محمد حسن** - عميد الكلية وعضوية كلاً من:

أ.د/طه ابراهيم فراج	وكيل الكلية لشئون التعليم والطلاب
أ.د/ممدوح صالح	رئيس قسم الهندسة المدنية
أ.م.د/محمد اسماعيل بسيوني	منسق برنامج هندسة الغاز الطبيعي
أ.م.د./ السيد جلال الغندور	منسق برنامج هندسة التشييد
أستاذة/ميادة محمد الفار	عضو ادارى

وبدأت الجلسة برئاسة السيد الأستاذ الدكتور/ حسن محمد حسن – عميد الكلية وتمت مناقشة الموضوعات التاليه :

١- التصديق على محضر الجلسة السابقة .

٢- بشأن تبني برنامج هندسة التشييد معايير ال NARS ٢٠١٨ .

٣- بشأن تبني ل برنامج هندسة الغاز الطبيعي معايير ال NARS ٢٠١٨.

٤- بشأن الطلب المقدم من الطالب/باسل أحمد عبدالخالق السيد أمارة – الفرقة الثالثة بقسم هندسة الغاز الطبيعي للاعتذار عن اداء امتحانات الفصل الدراسي الأول للعام الجامعي ٢٠٢٠-٢٠٢١.

٥- بشأن الطلب المقدم من الطالب /محمد عمرو سعد الموجي – الفرقة الثانية ببرنامج هندسة التشييد للاعتذار عن اداء امتحانات الفصل الدراسي الأول للعام الجامعي ٢٠٢٠-٢٠٢١.

٦- بشأن الطلب المقدم من الطالب /فارس الرافعي الباز – الفرقة الأولي ببرنامج هندسة التشييد للاعتذار عن اداء امتحانات الفصل الدراسي الأول للعام الجامعي ٢٠٢٠-٢٠٢١م

الموضوع الاول: التصديق على محضر الجلسة السابقة .

القرار(١): تمت المصادقة.

الموضوع الثاني: بشأن تبني المعايير الاكاديمية القومية القياسية (NARS 2018) الصادرة عن الهيئة القومية لضمان الجودة والاعتماد كمعايير قياسية مرجعية لتوصيف برنامج ومقررات مرحلة البكالوريوس ببرنامج هندسة الغاز الطبيعي .

القرار(٢): وافقت اللجنة .

نهي٢٠٢١/٢/٢٨

٢٥٥
[illegible]

الموضوع التاسع عشر: احاطة اللجنة بملاحظات تقرير المراجعة الخارجية بمعرفة الأستاذ الدكتور **عطية محمود** -كلية الهندسة – الجامعة البريطانية لتوصيف برنامج أكاديمي (ومقرراته) الخاصة **ببرنامج هندسة الغاز الطبيعي** والرد عليها.

القرار(١٩): أحيطت اللجنة علماً.

الموضوع العشرين : اعتماد التوصيف للبرنامج والمصفوفة والمقررات **لبرنامج هندسة الغاز الطبيعي** طبقا لمعايير NARS 2018 بعد الاخذ في الاعتبار راي المراجع الداخلي والخارجي.

القرار(٢٠): أحيطت اللجنة علماً.

الموضوع الحادى والعشرين :اعتماد التوصيف للبرنامج والمصفوفة والمقررات **لبرنامج هندسة التشييد** طبقا لمعايير NARS 2018 بعد الاخذ في الاعتبار راي المراجع الداخلي والخارجي.

القرار(٢١): أحيطت اللجنة علماً.

عميد الكلية

أ.د/ حسن محمد حسن

تمهيد:

- فى بداية الجلسة رحب السيد أ.د/**حسن محمد حسن**- عميد الكلية بالسادة أعضاء مجلس الكلية
- وتقدم بخالص الشكر لكلا من السادة الاتى اسماؤهم وذلك لعمل فيديو يوضح اهم المواد المتاحة للكلية طبقا لطلب هيئة ضمان الجودة والاعتماد لرفعه ضمن الوثائق المطلوب.
  - **السيدة الدكتوره/هبه عبد العاطى**- مدير وحدة الجودة لاخراج وكتابه التعليق الصوتي.
  - **المهندس/عبد الرحمن احمد صالح** - المعيد بقسم الهندسة المدنية لكتابه التعليق الصوتي.
  - **الطالب/مؤمن الهوارى**- طالب بالفرقة الثانية قسم الهندسة المدنية لكتابه التعليق الصوتي.
  - **الطالب/شادى عيسي**- طالب بالفرقة الثانية قسم الهندسة المدنية لقيامه بالتصوير والمونتاج.

اولا:المصادقة:-

- **التصديق علي مجلس الكلية الجلسة(٦) والذى عقد بتاريخ ١٤ /٢/٢٠٢١م**

القرار: صادق المجلس

ثانيا: إحاطة المجلس علما بشأن موضوعات اللجان المنبثقة عن مجلس الكلية

الموضوع الاول:

بشأن احاطة مجلس الكلية علماً **بموضوعات لجنة المختبرات والمعامل المنعقدة بتاريخ ٧ /٣/٢٠٢١م**

القرار: احيط المجلس علماً

الموضوع الثانى:

بشان اقتراح لجنة المختبرات والمعامل المنعقدة بتاريخ ٧ /٣/٢٠٢١م **بالموافقة** على شراء اجهزة ومعدات لمعمل الطاقة الشمسية بقيمة تقديرية فى حدود مبلغ ٣٠٠,٠٠٠ (ثلاثمائة الف جنيها لا غير) وذلك لاهميتها العملية والعلمية لطلاب القسم والعملية التعليمية.

القرار: وافق المجلس

الموضوع الثالث:

بشأن احاطة مجلس الكلية علماً **بموضوعات لجنة المكتبات بتاريخ ٧ /٣/٢٠٢١م**

القرار: احيط المجلس علماً

ثالثا: وحدة توكيد الجودة والاعتماد:

الموضوع الاول :

بشأن عرض معايير NARS 2018 المتبناه للائحة ٢٠١٤ للاقسام الاتيه:-

١. قسم الهندسة البحرية وعمارة السفن
٢. قسم الهندسة الكهربية(شعبة قوى كهربيه)
٣. قسم الهندسة الكهربية(شعبة اتصالات)
٤. قسم الهندسة الكهربية(شعبة حاسبات)
٥. قسم الهندسة المعمارية والتخطيط العمراني
٦. قسم هندسة الانتاج والتصميم الميكانيكي
٧. قسم الهندسة المدنية
٨ . برنامج الغاز
٩. قسم القوى الميكانيكية
١٠. قسم الهندسة الكيميائية
١١. برنامج التشيد

القرار: وافق المجلس

الموضوع الثانى :

بشأن **الموافقة** على قائمة المراجعين الخارجيين للبرامج الاكاديمية (مرحلة البكالوريوس) ٢٠٢١/٢٠٢٠ المرشحين من الاقسام العلمية على النحو التالى:-

القسم	الاسم	الكليه/الجامعة
الهندسة المدنية	أ.د/ابراهيم هاشم	كليه الهندسة–جامعة المنوفيه
الهندسة الكهربية(شعبه قوى كهربيه)	أ.د/ابراهيم بدران	كليه الهندسة–جامعة المنصوره
الهندسة الكهربية(شعبه اتصالات)	أ.د/سيد ربيعي	كليه الهندسة–جامعة المنوفية
الهندسة الكهربية (شعبه حاسبات)	أ.د/ابراهيم بدران	كليه الهندسة– جامعة المنصوره
هندسة الانتاج التصميم الميكانيكي	أ.د/مصطفى شعبان	كليه الهندسة– جامعةعين شمس
الهندسة المعمارية والتخطيط العمراني	أ.د/محمد هشام السعودى	كليه الفنون الجميلة– جامعة الاسكندرية
الهندسة البحرية وعمارة السفن	أ.د/احمد الحيوي	كليه الهندسة–جامعة الاسكندرية
الهندسة الكيميائية	أ.د/فاطمة عاشور	كليه الهندسة–جامعة القاهرة
برنامج الغاز	أ.د/عطية محمد عطية	الجامعة البريطانية
برنامج التشيد	أ.د/ابراهيم هاشم	كليه الهندسة–جامعة منوف
الفيزيقا والرياضيات الهندسية	أ.د/ميرفت ابو الخير	كليه الهندسة – جامعة المنصوره

القرار: وافق المجلس

الموضوع الثالث :

بشأن **الموافقة** على قائمة المراجعين الداخلين للبرامج الاكاديمية (مرحلة البكالوريوس) ٢٠٢١/٢٠٢٠ المرشحين من الاقسام العلمية على النحو التالى:-

القسم	الاسم
الهندسة المدنية	أ.د/محمد محمد الغندور
الهندسة الكهربية(شعبه قوى كهربيه)	أ.د/صبحي سرى
الهندسة الكهربية(شعبه اتصالات)	أ.د/راوية يحي رزق
الهندسة الكهربية (شعبه حاسبات)	أ.د/راوية يحى رزق
هندسة الانتاج التصميم الميكانيكي	أ.د/شعبان عبده ابراهيم
الهندسة المعمارية والتخطيط العمراني	أ.د/نجلاء على مجاهد
الهندسة البحرية وعمارة السفن	أ.د/عادل عبد الله توفيق
الهندسة الكيميائية	أ.د/طه ابراهيم فراج
برنامج الغاز	أ.د/ممدوح جاد الله
برنامج التشيد	أ.د/محمد محمد الغندور
الفيزيقا والرياضيات الهندسية	أ.د/يوسف هاشم زهران

القرار: وافق المجلس

رابعا: شئون أعضاء هيئة التدريس

الموضوع الاول:

بشأن اقتراح مجلس قسم هندسة الانتاج والتصميم الميكانيكي بجلسته المنعقدة في ٢٠٢١/٢/٢٨م **بالموافقة** على تعيين **المهندسة / الشيماء جمال عبد الناصر ابراهيم علي عثمان** ــ المدرس المساعد بذات القسم ــ بوظيفة مدرس بالقسم , حيث أنها حصلت على درجة دكتوراه الفلسفة في هندسة الانتاج والتصميم الميكانيكي طبقا لقرار أ .د/ رئيس الجامعة في ٢٠٢١/٢/٢٥م, علما بأنها على رأس العمل وملتزمة في عملها ومسلكها منذ تعيينها بالقسم .

القرار: وافق المجلس

Port Said University
Faculty of Engineering
Dean Office

جامعة بورسعيد
كلية الهندسة
مكتب عميد الكلية

السيد الأستاذ الدكتور / ايمن محمد ابراهيم

رئيس جامعة بورسعيد

تحية طيبة وبعد ،،،،

نحيط سيادتكم علما بموافقة مجلس الكليه بتاريخ ٢٠٢١/٣/١٣ على تبني معايير NARS 2018 للائحة ٢٠١٤ للاقسام الاتيه:-

١. قسم الهندسة البحرية وعمارة السفن
٢. قسم الهندسة الكهربية(شعبة قوى كهربيه)
٣. قسم الهندسة الكهربية(شعبة اتصالات)
٤. قسم الهندسة الكهربية(شعبة حاسبات)
٥. قسم الهندسة المعمارية والتخطيط العمراني
٦. قسم هندسة الانتاج والتصميم الميكانيكي
٧. قسم الهندسة المدنية
٨. برنامج الغاز
٩. قسم القوى الميكانيكية
١٠. قسم الهندسة الكيميائية
١١. برنامج التشييد

لذا برجاء التكرم بالموافقه على عرض الموضوع على مجلس الجامعة

وتفضلوا بقبول فائق الاحترام ،،

عميد الكلية

٢٠٢١/٣/٢٩

أ.د / حسن محمد حسن

Tel: (02-066) 3403459 -3446101
Fax: (02-066) 3400936
E-mail: dean_office@eng.psu.edu.eg

ت: (٠٦٦) ٣٤٠٣٤٥٩ -٣٤٤٦١٠١
ف: ٠٦٦) ٣٤٠٠٩٣٦

توصيف المقررات

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Physics and Mathematical engineering		
Course Code	BSM 011 / Physics I		
Year / Level / Semester	Preparatory Year (Freshman)		
Prerequisite	None		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	3	-	3

2 Course aims:

No.	Aim
1	Describe phenomena and theories of waves and heat, type of modulus of elasticity, Newton's law of cooling and thermodynamics laws.

3 Learning Outcomes (LOs):

A1.1	Distinguish between the fine measurements.
A1.2	Describe the waves, its properties, the interference of waves and the parameters which effect on it.
A1.3	Identify the temperature scales, the different kinds of Thermometers, thermal heat conductivity for different materials and the Triple point.
A1.4	Recognize the Kinetic Theory of gases, the Heat engine, Otto Cycle, Heat pump Cooling cycle by vapor pressure and the Meaning of Entropy.
A1.5	Show the types of substances according to Elasticity materials problems and different laws of thermodynamic.
A2.1	Evaluate the results given from experiments.
A2.2	Analyze data given from experiments.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Electrostatic force due to charged particles. • Electric field due to continuous distribution of charge. • Effect of electric field on charged particle and Electric dipole. **Labs:** • Verify Ohm’s law experimentally and investigate law of series and parallel connections	1-2
2	**Lectures:** • Electric flux and Gauss law • Applications of Gauss law.	3
3	**Lectures:** • Electric potential, Potential difference and Potential energy.	4

	Labs: • Verify Stephan Boltzman's law of power	
4	**Lectures:** • Parallel-plate, spherical and cylindrical capacitors. • Electric current, Ohm's and Kirchhoff's law **Labs:** • Estimate the capacitance of a capacitor by discharging graph.	5-6
5	**Lectures:** • Magnetic field intensity • Magnetic flux and magnetic moment • Magnetic effect for the electric current (Biot-Savart Law). **Labs:** • Determine the magnitude of Earth magnetic field strength by using magnetometer and galvanometer.	7-8
6	Midterm	9
7	**Lectures:** • Faraday law of induction, Self-induction and mutual induction **Labs:** • Investigate law of electric transformer and its efficiency.	10-11
8	**Lectures:** • Alternative current circuits • RC, RL. RLC circuits – Resonance in electrical circuits. **Labs:** • Calculate the impedance of RLC circuit.	12-14
9	**Lectures:** • Electric Transformer **Labs:** • Final practical examination.	15

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-	**A1.1**	**x**	**x**				**x**								
	A1.2	**x**	**x**		**x**	**x**									

	A1.3	**x**	**x**	**x**		**x**	**x**								
	A1.4		**x**	**x**	**x**						**x**				
	A1.5			**x**											
	A2.1		**x**			**x**		**x**				**x**			**x**
	A2.2		**x**		**x**	**x**						**x**			**x**

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.2, A1.3
2	Practical	A2.1, A2.2
3	Oral Examination	A1.1, A1.2, A1.3
4	Formative (quizzes- online quizzes- reports)	A1.1, A1.2, A1.4
5	Final Term Examination (written)	A1.2, A1.3, A1.4, A1.5

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Practical/ Oral Examination	10
3	Formative (quizzes- online quizzes- presentation)	20
4	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	R.A. Serway and J.W. Jewett, "Physics for Scientists and Engineers", 6th Edition, Thomson Brooks/Cole 2014.
2	Edward M. Purcell and David J. Morin, "Electricity and Magnetism", 3rd Edition, Cambridge University, 2013.
3	Mckie D., Mckie C.," Essentials of crystallography" ,1st Edition,2011.
4	Kittle C.: Introduction to solid state physics 9th Edition, 2013.
5	- ترجمة د. سعيد الجز يرى2011 أساسيات الفيزياء – تأليف بوش – الطبعة الخامسة & د. محمد أمين سليمان.
6	2011.أساسيات الفيزياء الكلاسيكية والمعاصرة – تأليف أ. د. رأفت كامل واصف – الطبعة الأولي
7	2013فيزياء الجوامد – تأليف أ. د. محمد أمين سليمان و أ. د. أحمد فؤاد باشا و أ. د. شريف خيري

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No	Topic	aim	LO's
1	**Lectures:** • Electrostatic force due to charged particles. • Electric field due to continuous distribution of charge. • Effect of electric field on charged particle and Electric dipole. **Labs:** • Verify Ohm's law experimentally and investigate law of series and parallel connections	1	A1.1, A1.3, A2.1, A2.2
2	**Lectures:** • Electric flux and Gauss law • Applications of Gauss law.	1	A1.1, A1.3, A2.1, A2.2
3	**Lectures:** • Electric potential, Potential difference and Potential energy. **Labs:** • Verify Stephan Boltzman's law of power	1	A1.1, A1.3, A2.1, A2.2
4	**Lectures:** • Parallel-plate, spherical and cylindrical capacitors. • Electric current, Ohm's and Kirchhoff's law **Labs:**	1	A2.2

	- Estimate the capacitance of a capacitor by discharging graph.		
5	**Lectures:** - Magnetic field intensity - Magnetic flux and magnetic moment - Magnetic effect for the electric current (Biot-Savart Law). **Labs:** Determine the magnitude of Earth magnetic field strength by using magnetometer and galvanometer.	1	A2.2
6	- Midterm	1	A1.1, A1.3, A2.1, A2.2,
7	**Lectures:** - Faraday law of induction, Self-induction and mutual induction **Labs:** Investigate law of electric transformer and its efficiency.	1	A1.2, A1.3, A1.4, A1.5, A2.1
8	**Lectures:** - Alternative current circuits - RC, RL. RLC circuits – Resonance in electrical circuits. **Labs:** - Calculate the impedance of RLC circuit.	1	A1.2, A1.3, A1.4, A1.5, A2.1
9	**Lectures:** - Electric Transformer **Labs:** - Final practical examination.	1	A1.2, A1.3, A1.4, A1.5, A2.1

Course: BSM 011 Physics (1)	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Distinguish between the fine measurements. A1.2 Describe the waves, its properties, the interference of waves and the parameters which effect on it. A1.3 Identify the temperature scales, the different kinds of Thermometers, thermal heat conductivity for different materials and the Triple point.

	A1.4 Recognize the Kinetic Theory of gases, the Heat engine, Otto Cycle, Heat pump Cooling cycle by vapor pressure and the Meaning of Entropy. A1.5 Show the types of substances according to Elasticity materials problems and different laws of thermodynamic.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Evaluate the results given from experiments. A2.2 Analyze data given from experiments.

Course Coordinator: Assistant Prof. Dr. Abdel Naser Ahmed Mansour

Program Coordinator: Assoc. Prof. Mohamed Bassouni

Head of Department: Prof. Dr. Hassan El-Ghattas

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	NGEP		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	BSM 012 / General Chemistry		
Year / Level / Semester	Preparatory Year		
Prerequisite	None		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	3

2 Course aims:

No.	**aim**
1	Identify essential knowledge of basic principles, laws and theories of physical Chemistry, applied chemistry, which are necessary for engineering students. Quantitative and theoretical study of the properties and structure of matter and their relation to the interaction of matter with energy will be discussed.

3 Learning Outcomes (LOs):

A1.1	Recognize the ability to solve quantitative problems in matter changes
A1.2	Outline the comprehension the physical effects on the chemical compounds and recognize its chemical structure
A1.3	Recognize the equations of physical chemistry
A1.4	Define and different topics and theories of physical chemistry
A2.1	Investigate the behavior of gases
A2.2	Estimate the difference between the physical and chemical properties of different matters
A2.3	Discuss how to apply mathematics in chemistry in such a way that the equations paint a clear picture of the physical phenomena being studied
A2.4	Identify the Physical behavior of solid, liquid gas and mixed phase
A8.1	Communicate verbally with the colleagues in the lab to Investigate the quantitative and the qualitative analysis for acidic and basic radicals

4 Course Contents:

No.	**Topics**	**Week**
1	**Chapter 1: physical chemistry** -Introduction to physical Chemistry -Major consideration in physical chemistry: Matter – quantifying matter (SI & cgs units) and derived SI units. - Introduction to lab. Work: Introduction to the quantitative & qualitative analysis -Properties of gases -The perfect gas - gas laws -Problems -The real gas. -Molecular interactions – Van der Waals equation. Kinetics theory of gases. Problems. **Chemistry lab**:	*Week-1-3*

	• -Identification of acid and base radical:	
2	**Chapter 2: chemical thermodynamics and thermochemistry** **-**First law of thermodynamics, energy & work. -Second law of thermodynamics – heats of reactions (enthalpy) – laws of heat reactions -standard states – spontaneous of chemical reaction – entropy and free energy problems. **Chemistry lab**: • -Identification of acid and base radical:	*Week-4-5*
3	**Chapter 3: Chemical equilibrium**: -Chemical equilibrium, the relation between K_c & K_p. Factors affecting on the chemical equilibrium- Law of mass action and reversible reactions. - Ionic theory – ionization of water. Problems -Titration process and titration curves – indicators – hydrolysis of salts. -Solubility product & common ion effect- problems **Chemistry lab**: • Volumetric analysis (acid –base titration)	*Week-6-8*
4	**Midterm**	*Week 9*
5	**Chapter 4: Electrochemistry:** Definition of oxidation & reduction, examples. Oxidation reduction reactions – oxidizing and reducing agents Electrolysis -Application of electrochemistry on the corrosion of metals **Chemistry lab**: • Volumetric analysis- oxidation-reduction titration	*Week-10-11*
6	• Revision	*Week-12-13*

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online/ in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x			x									
	A1.2	x	x												
	A1.3	x	x			x									

	A1.4	x	x			x									
	A2.5	x	x												
	A2.1	x	x					x							x
	A2.2	x	x												x
	A2.3	x	x												x
	A2.4	x	x					x							
	A2.5	x	x				x								
	A8.1						x								x

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online/offline lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	Los
1	Mid Term Examination (written/ online)	A1-1, A1-2, A1-3, A1-4, A1-5, A2-4, A2-5
2	Practical	A2-1, A2-2, A2-3, A8-1
3	Oral Examination	A1-1, A1-2, A1-3, A1-4, A1-5
4	Formative (quizzes- online quizzes- reports)	A1-1, A1-2, A1-3, A1-4, A1-5, A2-1,
5	Final Term Examination (written)	A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3, A2-4, A2-5, A8-1,

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Practical/ Oral Examination	10
3	Formative (quizzes- online quizzes-presentation -reports)	20
4	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	Atkins. Peter, Julio de Paula, James Keeler, "Physical chemistry ", 11th ed, Oxford University Press, 2019.
2	I.N. Levine, " Physical chemistry", 6th ed, The McGraw-Hill Companies, 2009.
3	J. Brady and G. Humistom "General chemistry, Principles and structure", 5th ed. John Wiley and Sons Inc., 1990.
4	Francis A Carey, Robert M Giuliano, 11th ed, Mc Graw Hill Education, 2017.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	laboratory Usage:
3	Library Usage
4	White Board
5	Data Show System
6	Presenter

10 Matrix of Knowledge and Skills of the Course:

1.1.1.1 No.	10.1.1.1.2 Topic	Aim	LO's
1	**Chapter 1: physical chemistry** -Introduction to physical Chemistry -Major consideration in physical chemistry: Matter – quantifying matter (SI & cgs units) and derived SI units -Properties of gases -The perfect gas - gas laws -Problems - The real gas -Molecular interactions – Van der Waals equation. Kinetics theory of gases- Problems **Chapter 2: Organic Chemistry** -Introduction to organic chemistry:	1	A1-1 A1-2 A1-3 A1-4

	-Lewis symbols, chemical bonding - electronic distributions Nomenclature of organic compounds – hybridization of orbital -Physical properties of organic compounds, aliphatic compounds, and their derivatives effect of structure on the chemical properties **Chemistry lab**: -Introduction to the quantitative & qualitative analysis -Standardization of sodium Carbonate solution -Standardization of Hydrochloric acid solution using sodium Hydroxide solution		A1-5 A2-1 A2-2 A2-3 A8-2
2	**Chapter 3: chemical thermodynamics and thermochemistry** -First and second law of thermodynamics – heats of reactions – laws of heat reactions - standard states – spontaneous of chemical reaction – entropy and free energy **Chapter 4: Electrochemistry:** -Electrolysis -Application of electrochemistry on the corrosion of metals **Chemistry lab**: -Titration of strong acid against strong base Analysis of alkaline mixture	1	A1-1 A1-2 A1-3 A1-4 A8-2
3	**Chapter 5: Chemical equilibrium**: -Law of mass action and reversible reactions Ionic theory – ionization of water - titration process and titration curves – indicators – hydrolysis of salts. Solubility product & common ion effect **Chemistry lab**: -Analysis of acidic mixture	1	A2-1 A2-2 A2-3 A2-4 A8-1
4	**Midterm**	1	A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3, A2-4, A2-5,
5	**Chapter 6: Natural gas & Petroleum oil:** -Composition of natural gas – process of separation **Petroleum oil:** -Composition – Classification – Separations **Chemistry lab**: -Identification of metal cations	1	A1-1 A1-4 A2-3 A2-4 A8-1
6	**Chapter 7: Polymer chemistry:** -Introduction – classification of polymers - Mechanism of polymerization – free radical mechanism competitive reactions -Anionic and cationic Mechanism of polymerization – copolymers -Mechanical properties of polymers - relation between mechanical properties & Temperature **Chemistry lab**: -Identification of metals cations	1	A1-4 A3-4 A2-5 A8-1

Course: “General Chemistry -BSM 021”	
Program LOs	**Course Los**
A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1-1- Recognize the ability to solve quantitative problems in matter changes. A1-2 Outline the comprehension the physical effects on the chemical compounds and recognize its chemical structure. A1-3 Recognize the equations of physical chemistry. A1-4 Define different topics and theories of physical chemistry. A1-5 State the difference between organic and inorganic samples.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2-1 Show the difference between the different types of polymers. A2-2 Investigate the behavior of gases. A2-3 Estimate the difference between the physical and chemical properties of different matters. A2-4 Discuss how to apply mathematics in chemistry in such a way that the equations paint a clear picture of the physical phenomena being studied. A2.5 Identify the Physical behavior of solid, liquid gas and mixed phase

A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Communicate verbally with the colleagues in the lab

Course Coordinator: Dr. Fathia M. Abd-Elrahim

Program Coordinator: Assoc. Prof. Mohamed Bassouni

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	BSM 013 / Mathematics I		
Year / Level / Semester	Preparatory Year (Freshman)		
Prerequisite	None		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	2	0

2 Course aims:

No.	Aim
1	Identify the essential knowledge about Calculus and some of its applications (Functions, Limits and continuity, Differentiation, Applications of Differentiation, and Partial Differentiation) and to have knowledge about Analytic Geometry and its applications (straight line, Ellipse, parabola, hyperbola, and circle equations).

3 Learning Outcomes (LOs):

A1.1	Recognize the functions (graphs and their properties), the differentiation and its applications, the partial differentiation and its applications and the geometric graphs and their equations.
A1.2	State acquaints with the continuity and different limits.
A1.3	Solve a variety of differentiation problems and the equations of straight line, Ellipse, parabola, hyperbola, and circle.
A1.4	Specify the problems to find its solutions.
A1.5	Use the suitable methods for solving the different types of differentiation and the suitable equations for different types of graphs.
A1.6	Distinguish the kinds of different types of differentiation and different types of geometric Graphs such as straight line, Ellipse, parabola, hyperbola, and circle equations.
A2.1	Acquire the experience to design differentiation problems and geometric problems and solve them.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** Chapter 1: The binomial theorem **Tutorials:** • Solve Problems	1
2	**Lectures:** Chapter2: The partial fractions **Tutorials:** • Solve Problems	2
3	**Lectures:** Chapter 3: Theory of equations and the approximate roots **Tutorials:** • Solve Problems	3

4	**Lectures:** Chapter 4: Two straight lines equation **Tutorials:** - Solve Problems	4
5	**Lectures:** Chapter 5: The conic sections **Tutorials:** - Solve Problems	5
6	**Lectures:** Chapter 6: The conic sections **Tutorials:** - Solve Problems	6
7	**Lectures:** Chapter 7: The circle and the sphere **Tutorials:** - Solve Problems	7
8	**Lectures:** Chapter 8: The general equation of second degree **Tutorials:** - Solve Problems	8
9	**Mid Term**	9
10	**Lectures:** Chapter 9: The straight line **Tutorials:** - Solve Problems	10
11	**Lectures:** Chapter 10: The plane **Tutorials:** - Solve Problems	11
12	**Lectures:** Chapter 11: The cone, and the cylindrical **Tutorials:** - Solve Problems	12
13	**Lectures:** Chapter 12: The quadratic surfaces **Tutorials:** - Solve Problems	13
14	**Lectures:** Chapter 13: The rotation of axes in spaces **Tutorials:** - Solve Problems	14

5 Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture (online/ in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	X					**x**								
	A1.2	X	**x**				**x**								
	A1.3	X		X			**x**	**x**							
	A1.4	X		X	**x**		**x**								
	A1.5	X	**x**				**x**								
	A1.6	X	**x**				**x**								
	A2.1	X	**x**			**x**	**x**	**x**							

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	Los
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1,3, A1.4, A1.6, A2.1
2	Formative (quizzes- online quizzes)	A1.1, A1.2, A1.3, A1.4, A1.6, A2.1
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A1.4, A1.5, A1.6, A2.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	**20**
2	Formative (quizzes- online quizzes)	**30**
3	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	Advanced Engineering Mathematics, Erwin Kreyszig, Wiley, 10th edition ,2011
2	William E. Boyce, Richard: "Elementary Differential Equations and Boundary Value Problems", John Wiley & Sons, Inc edition,2014

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures:** Chapter 1: The binomial theorem **Tutorials:** • Solve Problems	1	A1.1
2	**Lectures:** Chapter2: The partial fractions **Tutorials:** • Solve Problems	1	A1.1
3	**Lectures:** Chapter 3: Theory of equations and the approximate roots **Tutorials:** • Solve Problems	1	A1.4, A2.4

4	**Lectures:** Chapter 4: Two straight lines equation **Tutorials:** - Solve Problems	1	A1.2
5	**Lectures:** Chapter 5: The conic sections **Tutorials:** - Solve Problems	1	A1.2
6	**Lectures:** Chapter 6: The conic sections **Tutorials:** - Solve Problems	1	A1.2
7	**Lectures:** Chapter 7: The circle and the sphere **Tutorials:** - Solve Problems	1	A1.2, A1.3
8	**Lectures:** Chapter 8: The general equation of second degree **Tutorials:** - Solve Problems	1	A1.5, A2.4
9	**Mid Term**		A1.1, A1.2, A1.3, A1.4, A2.1, A2.2.
10	**Lectures:** Chapter 9: The straight line **Tutorials:** - Solve Problems	1	A1.3
11	**Lectures:** Chapter 10: The plane **Tutorials:** - Solve Problems	1	A1.3, A2.2
12	**Lectures:** Chapter 11: The cone, and the cylindrical **Tutorials:** - Solve Problems	1	A1.3, A2.1
13	**Lectures:** Chapter 12: The quadratic surfaces **Tutorials:** - Solve Problems	1	A1.3, A2.3
14	**Lectures:** Chapter 13: The rotation of axes in spaces **Tutorials:** - Solve Problems	1	A1.5, A2.4

Course: “Mathematics I- BSM 013”	
Program Los	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics	A1.1 Recognize the functions (graphs and their properties), the differentiation and its applications, the partial differentiation and its applications and the geometric graphs and their equations. A1.2 State acquaint with the continuity and different limits. A1.3 Solve a variety of differentiation problems and the equations of straight line, Ellipse, parabola, hyperbola and circle. A1.4 Specify the problems to find its solutions. A1.5 Use the suitable methods for solving the different types of differentiation and the suitable equations for different types of graphs. A1.6 Distinguish the kinds of different types of differentiation and different types of geometric Graphs such as straight line, Ellipse, parabola, hyperbola, and circle equations.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Acquire the experience to design differentiation problems and geometric problems and solve them.

Course Coordinator: Dr. Mohamed Khali EL Gayyar

Program Coordinator: Assoc. Prof. Mohamed Bassouni

Head of Department: Prof. Dr. Hassan El-Ghattas

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	BSM 014 / Mechanics I		
Year / Level / Semester	preparatory Level		
Prerequisite	None		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	2	0

2 Course aims:

No.	Aim
1	Recognize the principles of the mechanics and statics of particles, moments, Equilibrium's equations and solve any problem in a simple and logical manner

3 Learning Outcomes (LOs):

A1.1	Identify the mechanics and statics of particles.
A1.2	Recognize the laws of additions and multiplication of vectors.
A1.3	Define different methods to determine the resultant and moments of forces system
A1.4	Identify rectangular component of a force.
A2.1	Discuss the Reduction of a system of forces to one force and one couple.
A2.2	Evaluate Moment of force about a given Axis to the students
A2.3	Resolve the given force into a force at any point and a couple**.**
A2.4	Solve Equilibrium's equations of Rigid Bodies in two and three dimensions.
A2.5	Apply Distributed Forces: Centroids and Centers of Gravity.
A2.6	Solve some problems and collect some data.

4 Course Contents:

No.	Topics	Week
1	**Lectures: Chapter 1** Physical Quantities, Standard Units, Dimensions, Application on Vectors **Tutorials:** • Review examples of the Application on Vectors	1-2
2	**Lectures: Chapter 2** Resultant and Moments of a System of Forces- Equivalent System of Force **Tutorials:** -Solve the problems.	3-4
3	**Lectures: Chapter 3** Equilibrium of a Particle. A Rigid Body and a System of Rigid Bodies **Tutorials:** - Solve the Equilibrium of a Particle problems.	5-8
4	**Mid-term**	9
5	**Lectures: Chapter 4** Distributed Forces: Centroids and Centers of Gravity **Tutorials:**	10-11

	Solve the problems.	
6	**Lectures: Chapter5** Moment of Inertia **Tutorials:** Solve the problems of Moment of Inertia	12-14

5 Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture(online / in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x				x								
	A1.2	x	x	x		x									
	A1.3	x	x	x		x	x								
	A1.4	x	x												
	A2.1	x	x			x		x							
	A2.2	x	x												
	A2.3	x	x				x								
	A2.4	x	x				x								
	A2.5	x	x				x								
	A2.6	x	x				x								

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3
2	Formative (quizzes- online quizzes)	A2.4, A2.5,
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6.

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes)	30
3	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	Andrew Pytel and J. Kiusalaas, Engineering Mechanics Statics, Third Edition, 2010.
2	J L Meriam; L G Kraige; J N Bolton, “Engineering mechanics”, 2020.
3	Andrew Pytel; Jaan Kiusalaas, “Engineering mechanics. Dynamics”, 2017.
4	Erwin Kreyszig, "Advanced Engineering Mathematics” John Wiley & Sons Inc., 10th Edition, 2011
5	Ferdinand P. Beer and E. Russell Johnston, Jr.”Vector Mechanics for Engineers” – Statics Metric Edition adapted by G. Wayne Brown, Sir Sandford Fleming College, New York, 2010.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Chapter 1** Physical Quantities, Standard Units, Dimensions, Application on Vectors	1	A1.1, A1.2, A1.3, A1.4
2	**Chapter 2** Resultant and Moments of a System of Forces- Equivalent System of Force	1	A2.1, A2.2, A2.3

3	**Chapter 3** Equilibrium of a Particle. A Rigid Body and a System of Rigid Bodies		A2.4
4	Midterm	1	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3
5	**Chapter 4** Distributed Forces: Centroids and Centers of Gravity	1	A2.5, A2.6.
6	**Chapter5** Moment of Inertia	1	A2.5, A2.6.

Course: Mechanics (1)	
Program LOs	**Course LOs**
A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1-1- Identify the mechanics and statics of particles. A1-2- Recognize the laws of additions and multiplication of vectors. A1-3- Define different methods to determine the resultant and moments of a System of forces system. A-1-4- Identify rectangular component of a force.
A2- Develop and conduct appropriate experimentation and /or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2-1 Discuss the Reduction of a system of forces to one force and one couple. A2-2 Evaluate Moment of force about a given Axis to the students. A2-3 Resolve the given force into a force at any point and a couple**.** A2-4 Solve Equilibrium's equations of Rigid Bodies in two and three dimensions. A2-5 Apply Distributed Forces: Centroids and Centers of Gravity. A2-6 Solve some problems and collect some data.

Course Coordinator: Prof. Dr. Yousef Hashem Zahran.

Program Coordinator: Assoc. Prof. Mohamed Bassouni

Head of Department: Prof. Dr. Hassan El-Ghattas

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Production Engineering & Mechanical Design		
Course Code	BSM 021 / Engineering Drawing and Projection		
Year / Level / Semester	Preparatory year		
Specialization	Major		
Prerequisite	None		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	2	3

2 Course aims:

No.	aim
1	Provide the basic knowledge and skills of the concepts and principles of engineering drawing and fundamental of drawing projections. The basic principles of drawing with several applications are also studied.

3 Learning Outcomes (LOs):

A1.1	Identify the materials related to the parts of machines.
A1.2	Analyze the engineering problems that are used in engineering drawing.
A3.1	Apply the computer software (AutoCAD) for different drawing exercises.
A3.2	Employ the image and samples of machines drawing applications.
A10.1	Solve the different types of drawing exercises.
A10.2	Recognize the characteristics and processes related to the different machines and symbol drawing.
A10.3	Use engineering drawing and mechanics drawing handbook.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Geometric construction theories of view derivation. **Labs/Tutorials:** • Drawing of some exercise on geometric construction.	**1**
2	**Lectures:** • Orthographic projection of engineering bodies. **Labs/Tutorials:** • Drawing of some exercise for projection.	**2-3**

3	**Lectures:** • Projection of point, lines, surfaces, and bodies. **Labs/Tutorials:** • Drawing of some exercise for projection of a very simple shapes.	**4-5**
4	**Lectures:** • Derivation of views form isometrics drawings and vice versa. **Labs/Tutorials:** • Drawing of some exercise for isometrics and vice versa.	**6**
5	**Lectures:** • Derivations of views and sections from given vies. **Labs/Tutorials:** • Some exercise on the drawing of the third projection with the knowledge of the other projectors.	**7-8**
6	Midterm Exam	**9**
7	**Lectures:** • Intersections of bodies and surfaces and development of surfaces. **Labs/Tutorials:** • Exercise on the intersections of bodies.	10
9	Steel construction, Symbols of electrical circuits, fasteners.	**11**
10	**Lectures:** • Assembly of some mechanical components. **Labs/Tutorials:** • Exercise on Assembly of some mechanical components.	**12**
11	**Lectures:** • Computer aided drafting using solid-works **Labs/Tutorials:** • Exercise on Computer.	**13-14**

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture (online / in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	**x**	**x**		**x**	**x**									
	A1.2	**x**	**x**		**x**		**x**			**x**					
	A3.1	**x**	**x**		**x**	**x**	**x**	**x**							
	A3.2	**x**	**x**		**x**										

	A10.1	x	x		x					x	x	x			
	A10.2	x	x		x	x	x	x							
	A10.3										x	x			

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A3.2, A8.1, A8.2
2	Formative (quizzes- online quizzes)	A1.1, A1.2, A3.1, A3.2, A8.1, A8.2, A8.3
3	Final Term Examination (written)	A1.1, A1.2, A3.1, A3.2, A8.1, A8.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every 3 weeks
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes)	30
3	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	Engineering Drawing for prep year of the Faculty of Engineering, Port Said.
2	Boundy, A. W. "Engineering Drawing" Mc. Graw-Hill, 1980.
3	Heart, K. R. "Engineering Drawing with Problems and Solution" Hodder and Stoughton, 1970.

4	Mott, L.C." Engineering Drawing and Construction" Oxford University, Second Edition, 1976.
5	ابراهيم فوزى " الرسم الهندسى، الطبعة الرابعة، 1991-1992.
6	K. L. Narayana, P. Kannaiah, and K. Venkata Reddy ' Machine Drawing' New Age International (P) Ltd., 2006.
7	Fatehy El-shrif, ' Mechanical Drawing' Helwan Univ., 1975.
8	C. Simmons, D. Maguive, and N. Phelps, 'Manual of Engineering Drawing', Elsevier Ltd., 2009.
9	Book," Engineering Drawing", prepared by staff of production engineering and Machine design department

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures:** • Geometric construction theories of view derivation. **Labs/Tutorials:** • Drawing of some exercise on geometric construction.	1	A1.1, A3.1
2	**Lectures:** • Orthographic projection of engineering bodies. **Labs/Tutorials:** • Drawing of some exercise for projection.	1	A1.1, A3.1, A10.1
3	**Lectures:** • Projection of point, lines, surfaces, and bodies. **Labs/Tutorials:** • Drawing of some exercise for projection of a very simple shapes.	1	A1.1, A3.1, A10.1
4	**Lectures:** • Derivation of views form isometrics drawings and vice versa. **Labs/Tutorials:** • Drawing of some exercise for isometrics and vice versa.	1	A1.1, A3.1, A10.1
5	**Lectures:** • Derivations of views and sections from given vies. **Labs/Tutorials:** • Some exercise on the drawing of the third projection with the knowledge of the other projectors.	1	A1.1, A3.1, A10.1
6	Midterm Exam	1	A1.1, A1.2, A3.2, A10.1, A10.2

7	**Lectures:** • Intersections of bodies and surfaces and development of surfaces. **Labs/Tutorials:** • Exercise on the intersections of bodies.	1	A1.1, A3.1, A10.1
8	Steel construction, Symbols of electrical circuits, fasteners.	1	A1.1, A3.1
9	**Lectures:** • Assembly of some mechanical components. **Labs/Tutorials:** • Exercise on Assembly of some mechanical components.	1	A1.1, A3.1, A10.1

Course: “Engineering Drawing and Projection- BSM 021”	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the materials related to the parts of machines. A1.2 Analyze the engineering problems that are used in engineering drawing.
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.1 Apply the computer software (AutoCAD) for different drawing exercises. A3.2 Employ the image and samples of machines drawing applications.
A10. Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.	A10.1 Solve the different types of drawing exercises. A10.2 Recognize the characteristics and processes related to the different machines and symbol drawing. A10.3 Use engineering drawing and mechanics drawing handbook.

Course Coordinator: Prof. Dr. Abla El-Megharbel

Program Coordinator: Assoc. Prof. Mohamed El-Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattas

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Production Engineering & Mechanical Design		
Course Code	BSM 022 / Production Technology		
Year / Level / Semester	Preparatory Year (Freshman)		
Specialization	Major		
Prerequisite	None		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	6

2 Course aims:

No.	Aim
1	Identify the basic knowledge for both manufacturing and industrial engineering beside the information about engineering materials, workshop safety and bench work. Acquire knowledge and skills in the use of hand tools, layout tools, measuring tools and machine tools.

3 Learning Outcomes (LOs):

A1.1	Identify the classification of engineering materials according their crystal structures and their main properties.
A1.2	Recognize the tools and the methods that used in designing and manufacturing of casting processes.
A1.3	Demonstrate the essential knowledge to understand and conduct forming and cutting processes.
A2.1	Develop a creative and innovative way to select appropriate method to conduct forming, cutting, welding, and casting processes, considering design requirements.
A2.2	Professionally merge the engineering knowledge and understanding to assign a proper material and a suitable process considering design requirements.
A2.3	Use measuring instruments and workshops to conduct the practical part of the course.
A4.1	Utilize the essential knowledge to apply quality assurance requirements, codes of practice and standards, health and industrial safety requirements and environmental issues during conducting the workshops.
A4.2	Apply safe systems at work and observe the appropriate steps to manage risk during conducting the workshops.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Introduction to engineering materials. **Labs/Tutorials:** • Carpentry workshop.	1
2	**Lectures:** • Crystal structures of metals and alloys. **Labs/Tutorials:**	2-3

	- Models Workshop.	
3	**Lectures:** - Metal alloys – Powder metallurgy. **Labs/Tutorials:** - Casting Processes Workshop.	4
4	**Lectures:** - Casting processes. **Labs/Tutorials:** - Welding Workshop.	5-6
5	**Lectures:** - Forming processes (forging, rolling, extrusion and drawing). **Labs/Tutorials:** - Workbench Processes Workshop.	7-8
6	Midterm	9
7	**Lectures:** - Cutting processes (turning, planning, milling, drilling and grinding). **Labs/Tutorials:** - Lathing Workshop.	10-11
8	**Lectures:** - Welding processes **Labs/Tutorials:** - Machine workshop.	12
9	**Lectures:** - Bench Work (Filling, Taping, Drilling and Sawing). **Labs/Tutorials:** - Electricity Workshop.	13
10	**Lectures:** - Measuring tools, quality and safely. **Labs/Tutorials:**Laboratory measurements and measuring instrumentations	14

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture (online / in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	**x**	**x**			**x**	**x**								
	A1.2	**x**	**x**			**x**	**x**								

	A1.3	**x**	**x**			**x**	**x**								
	A2.1	**x**				**x**				**x**					**x**
	A2.2	**x**				**x**	**x**								**x**
	A2.3	**x**		**x**		**x**				**x**					**x**
	A4.1	**x**		**x**		**x**	**x**								
	A4.2	**x**		**x**		**x**				**x**					

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A2.1, A2.2, A4.1
2	Practical	A2.1, A2.2, A2.3,
3	Formative (quizzes- online quizzes- presentation)	A1.1, A1.2, A1.3, A2.1, A2.2, A2.3, A4.1, A4.2
4	Final Term Examination (written)	A1.1, A1.2, A1.3, A2.1, A2.2, A4.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical	15
3	Formative (quizzes- online quizzes- presentation)	Every 3 weeks
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Practical	10
3	Formative (quizzes- online quizzes- presentation)	20
4	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	Manufacturing Technology, by R.L. Timings, Published by Longman Scientific & Technical, 1993, ISBN 0340 700998.
2	Fundamentals of Manufacturing for Engineers, Published by University College London (UCL), 1996, ISBN 1-85728-338-4PB.
3	Mittemeijer, E. J. Fundamentals of Materials Science: The Microstructure–Property Relationship Using Metals as Model Systems, 2010.
4	Fundamentals of Manufacturing for Engineers, Published by University College London (UCL), 1996.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Lectures:** • Introduction to engineering materials. **Labs/Tutorials:** • Carpentry workshop.	1	A1.1, A1.2, A4.2
2	**Lectures:** • Crystal structures of metals and alloys. **Labs/Tutorials:** • Models Workshop.	1	A1.1, A1.2
3	**Lectures:** • Metal alloys – Powder metallurgy. **Labs/Tutorials:** • Casting Processes Workshop.	1	A1.1, A1.3, A2.2, A2.3, A4.1
4	**Lectures:** • Casting processes.	1	A1.1, A1.2, A2.3, A4.2

	Labs/Tutorials: - Welding Workshop.		
5	**Lectures:** - Forming processes (forging, rolling, extrusion and drawing). **Labs/Tutorials:** - Workbench Processes Workshop.	1	A1.3, A2.2, A2.3, A4.1
6	Midterm	1	A1.1, A1.2, A1.3, A2.1, A2.2, A4.1
7	**Lectures:** - Cutting processes (turning, planning, milling, drilling and grinding). **Labs/Tutorials:** - Lathing Workshop.	1	A1.3, A2.2, A2.3, A4.1
8	**Lectures:** - Welding processes **Labs/Tutorials:** - Machine workshop.	1	A2.1, A2.2, A2.3, A4.1, A4.2
9	**Lectures:** - Bench Work (Filling, Taping, Drilling and Sawing). **Labs/Tutorials:** - Electricity Workshop.	1	A1.3, A2.2, A4.2
10	**Lectures:** - Measuring tools, quality and safely. **Labs/Tutorials:** - Laboratory measurements and measuring instrumentations.	**1**	A2.2, A2.3

Course: “Production Technology- BSM 022”	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the classification of engineering materials according their crystal structures and their main properties. A1.2 Recognize the tools and the methods that used in designing and manufacturing of casting processes. A1.3 Demonstrate the essential knowledge to understand and conduct forming and cutting processes.

A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Develop a creative and innovative way to select appropriate method to conduct forming, cutting, welding, and casting processes, considering design requirements. A2.2 Professionally merge the engineering knowledge and understanding to assign a proper material and a suitable process considering design requirements. A2.3 Use measuring instruments and workshops to conduct the practical part of the course.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Utilize the essential knowledge to apply quality assurance requirements, codes of practice and standards, health and Industrial safety requirements and environmental issues during conducting the workshops. A4.2 Apply safe systems at work and observe the appropriate steps to manage risk during conducting the workshops.

Course Coordinator: Prof. Dr. Ahmed Nassef

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	BSM 023 / Mathematics II		
Year / Level / Semester	Preparatory Year (Freshman)		
Prerequisite	Mathematics l		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	2	0

2 Course aims:

No.	Aim
1	Identify all techniques of integration, Numerical integration, and Fundamental Theorem of Calculus. As well as partial fraction-Mathematical, Complex Numbers-Determinates-Matrices-Theory of reminder and Synthetic Division-Theory of equations-set theory.

3 Learning Outcomes (LOs):

A1.1	Recognize the functions (graphs and their properties), the differentiation and its applications, the partial differentiation and its applications and the geometric graphs and their equations.
A1.2	Categorize the continuity and different limits and a variety of differentiation problems.
A1.3	Define the definite integral and Substitution-Integration by parts numerical methods.
A1.4	Apply integration methods to find areas.
A1.5	Differentiate between the different types of differentiation and the different geometric equations.
A1.6	Use the suitable methods for solving the different types of differentiation and the suitable equations for different types of graphs.
A2.1	Integrate exponential and logarithmic functions.
A2.2	Evaluate integrals using Trigonometric substitutions.
A2.3	Relate derivatives and integrals (Fundamental Theorem of calculus).
A2.4	Estimate integral with finite sum.
A2.5	Evaluate the area between two curves.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** Chapter 1: Functions **Tutorials:** - Solve Problems	1
2	**Lectures:** Chapter2: Limits and Continuity **Tutorials:**	2

	• Solve Problems	
3	**Lectures:** Chapter 3: Differentiation **Tutorials:** • Solve Problems	3
4	**Lectures:** Chapter 4: Applications of differentiation **Tutorials:** • Solve Problems	4
5	**Lectures:** Chapter 5: Partial Differentiation **Tutorials:** • Solve Problems	5
6	**Lectures:** Chapter 6: Indefinite integrals **Tutorials:** • Solve Problems	6
7	**Lectures:** Chapter 7: Integration methods **Tutorials:** • Solve Problems	7
8	**Lectures:** Chapter 8: Definite integral **Tutorials:** • Solve Problems	8
9	**Mid Term**	9
10	**Lectures:** Chapter 9: Improper integral **Tutorials:** • Solve Problems	10
11	**Lectures:** Chapter 10: Applications (areas, arc length, volume) **Tutorials:** • Solve Problems	11
12	**Lectures:** Chapter 11: Numerical integration **Tutorials:** • Solve Problems	12
13	**Lectures:** Chapter 12: Trapezoidal rule **Tutorials:** • Solve Problems	13
14	**Lectures:** Chapter 13: Simpson's rule - RIVISION **Tutorials:** • Solve Problems	14

5 Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x				x									
	A1.2	x	x				x									
	A1.3	x	x	x			x									
	A1.4	x	x				x									
A-Level	**A1.5**	x	x	x		x	x	x								
	A1.6	x	x			x	x									
	A2.1	x	x				x									
	A2.2	x	x				x									
	A2.3	x	x			x	x	x								
	A2.4	x	x	x		x	x	x								

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.7, A2.1, A2.3, A2.6
2	Formative (quizzes- online quizzes)	A1.1, A2.3, A1.3, A1.5, A1.7, A2.6
3	Final Term Examination (written)	A1.1, A1.2 A1.3, A1.3, A1.4, A1.5, A1.6, A1.7, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6, A2.7

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes)	30
3	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	Advanced Engineering Mathematics, Erwin Kreyszig, 10th edition (August 16, 2011) -Publisher: Wiley
2	William E. Boyce, Richard: “Elementary Differential Equations and Boundary Value Problems", John Wiley & Sons, Inc..(4ed.2014)
3	Calculus 5e, James Stewart, McMaster university, Thomson, Australia, 2003.
4	Erwin Kreyszig :"Advanced Engineering Mathematics” John Wiley & Sons, N.Y 10th edition, 2011)

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Lectures:** Chapter 1: Functions **Tutorials:** • Solve Problems	1	A1.1
2	**Lectures:** Chapter2: Limits and Continuity **Tutorials:** • Solve Problems	1	A1.2
3	**Lectures:** Chapter 3: Differentiation **Tutorials:** • Solve Problems	1	A1.5

4	**Lectures:** Chapter4: Applications of differentiation **Tutorials:** • Solve Problems	1	A1.6
5	**Lectures:** Chapter 5: Partial Differentiation **Tutorials:** • Solve Problems	1	A1.5
6	**Lectures:** Chapter 6: Indefinite integrals **Tutorials:** • Solve Problems	1	A1.3
7	**Lectures:** Chapter 7: Integration methods **Tutorials:** • Solve Problems	1	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6.
8	**Lectures:** Chapter 8: Definite integral **Tutorials:** • Solve Problems	1	A1.3, A2.4
9	**Lectures:** Chapter 9: Improper integral **Tutorials:** • Solve Problems	1	A2.1, A2.2
10	**Mid Term**	1	A2.1, A2.2
11	**Lectures:** Chapter 10: Applications (areas, arc length, volume) **Tutorials:** • Solve Problems	1	A2.5
12	**Lectures:** Chapter 11: Numerical integration **Tutorials:** • Solve Problems	1	A2.3
13	**Lectures:** Chapter 12: Trapezoidal rule **Tutorials:** • Solve Problems	1	A2.6

Course: “Mathematics II- BSM 023”	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Recognize the functions (graphs and their properties), the differentiation and its applications, the partial differentiation and its applications and the geometric graphs and their equations. A1.2 Categorize the continuity and different limits and a variety of differentiation problems. problems A1.3 Define the definite integral and Substitution-Integration by parts numerical methods. A1.4 Apply integration methods to find areas. A1.5 Differentiate between the different types of differentiation and the different geometric equations A1.6 Use the suitable methods for solving the different types of differentiation and the suitable equations for different types of graphs.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Integrate exponential and logarithmic functions. A2.2 Evaluate integrals using Trigonometric substitutions. A2.3 Relate derivatives and integrals (Fundamental Theorem of calculus.(A2.4 Estimate integral with finite sum. A2.5 Evaluate the area between two curves.

	A2.6 Integrate using: Trapezoidal rule-Simpson’s rule.
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Recognize the functions (graphs and their properties), the differentiation and its applications, the partial differentiation and its applications and the geometric graphs and their equations. A1.2 Categorize the continuity and different limits and a variety of differentiation problems. problems A1.3 Define the definite integral and Substitution-Integration by parts numerical methods. A1.4 Apply integration methods to find areas. A1.5 Differentiate between the different types of differentiation and the different geometric equations A1.6 Use the suitable methods for solving the different types of differentiation and the suitable equations for different types of graphs.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Integrate exponential and logarithmic functions. A2.2 Evaluate integrals using Trigonometric substitutions. A2.3 Relate derivatives and integrals (Fundamental Theorem of calculus.(A2.4 Estimate integral with finite sum.

	A2.5 Evaluate the area between two curves. A2.6 Integrate using: Trapezoidal rule-Simpson’s rule.

Course Coordinator: Dr. Youssef Aly Mohamed Baghdadi

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattas

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	BSM 024 / Mechanics II		
Year / Level / Semester	Preparatory Year (Freshman)		
Prerequisite	Mechanics l		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	2	0

2 Course aims:

No.	aim
1	Identify the principles of dynamics, Rectilinear and Curvilinear motion, the Linear momentum, Angular momentum of particles, and solve any problem in a simple and logical manner

3 Learning Outcomes (LOs):

A1.1	Identify the Rectilinear motion of particles (Position, Velocity, and acceleration).
A1.2	Recognize the Curvilinear motion of particles (Position vector, Velocity and Acceleration).
A1.3	Define the Linear Momentum of particles, rate of change of Linear Momentum.
A1.4	Identify the equations of motion.
A2.1	Discuss the Angular momentum of particles.
A2.2	Evaluate the Trajectory of particles under a central force.
A2.3	Resolve the equations of motion in different coordinates**.**
A2.4	Solve the Projectiles problems.
A2.5	Apply to the Central Impact of two Spheres.
A2.6	Solve the Loss of Kinetic Energy during the Impact of two Spheres.

4 Course Contents:

No.	Topics	Week
1	**Lectures: Chapter 1** • Motion in straight line. **Tutorials:** • Solve the problems of Motion in straight line.	1-2
2	**Lectures: Chapter 2** • Motion in resistance medium **Tutorials:** • Solve the problems.	3-4
3	**Lectures: Chapter 3** • Motion in plane and its applications **Tutorials:**	5-8

	- Solve the projectiles problems.	
4	**Mid-Term**	9
5	**Lectures: Chapter 4** - Momentum, impulse and impact **Tutorials:** - Solve the problems.	10-11
6	**Lectures: Chapter5** - Rotation motion **Tutorials:** - Solve the problems of Rotation motion	12-14

Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture(online/ in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x				x								
	A1.2	x	x			x									
	A1.3	x	x			x	x								
	A1.4	x	x												
	A2.1	x	x			x		x							
	A2.2	x	x												
	A2.3	x	x				x								
	A2.4	x	x				x								
	A2.5	x	x				x								
	A2.6	x	x				x								

5 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

6 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3
2	Formative (quizzes- online quizzes)	A2.4, A2.5,
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6.

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes)	30
3	Final Term Examination (written)	50
Total		100%

7 List of References

No.	Reference List
1	Vector mechanics for engineers Dynamics, Ninth Edition, Ferdinand and , P. Beer (2013)
2	Andrew Pytel; Jaan Kiusalaas, “Engineering mechanics. Dynamics”, 2017
3	Erwin Kreyszig, "Advanced Engineering Mathematics” John Wiley & Sons Inc., 10th Edition, 2010.
4	Ferdinand P. Beer and E. Russell Johnston, Jr.”Vector Mechanics for Engineers” Dynamics Metric Edition adapted by G. Wayne Brown, Sir Sandford Fleming College, New York , 2014.

8 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

9 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Chapter 1** Motion in straight line.	1	A1.1, A1.2, A1.3, A1.4
2	**Chapter 2** Motion in resistance medium	1	A2.1, A2.2, A2.3
3	**Chapter 3** Motion in plane and its applications		A2.1, A2.2, A2.3
4	Midterm	1	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3
5	**Chapter 4** Momentum, impulse and impact	1	A2.4, A2.5, A2.6.
6	**Chapter5** Rotation motion	1	A2.5, A2.6.

Course: “Mechanics II - BSM 024”	
Program LOs	**Course LOs**
A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the Rectilinear motion of particles (Position, Velocity, and acceleration). A1.2 Recognize the Curvilinear motion of particles (Position vector, Velocity and Acceleration). A1.3 Define the Linear Momentum of particles, rate of change of Linear Momentum. A1.4 Identify the equations of motion.

A2- Develop and conduct appropriate experimentation and /or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2-1 Discuss the Angular momentum of particles. A2-2 Evaluate the Trajectory of particles under a central force. A2-3 Resolve the equations of motion in different coordinates**.** A2-4 Solve the Projectiles problems. A2-5 Apply to the Central Impact of two Spheres. A2-6 Solve the Loss of Kinetic Energy during the Impact of two Spheres.

Course Coordinator: Prof. Dr. Yousef Hashem Zahran.

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattas

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Electrical Engineering Department		
Course Code	BSM 025 / Computers		
Year / Level / Semester	Preparatory Year (Freshman)		
Specialization	Major		
Prerequisite	------		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	3

2 Course aims:

No.	Aim
1	Describe an introduction to personal computer, operating systems, filling systems, introduction to word processing, spread sheet theory, introduction to data base, multi-media and presentations, introduction to computer networks.

3 Learning Outcomes (LOs):

A1.1	Define the concept of personal computers.
A1.2	Describe and review of basic computer languages.
A3.1	Describe the different word processing tools.
A3.2	Develop spreadsheets exercises.
A3.3	Create different types and designs of presentations.
A10.1	Prepare different database panes.
A10.2	Apply different techniques to relate surfing the network.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Introduction to PC **Labs/Tutorials:** • Operating Systems (DOS – WINDOWS)	1-2
2	**Lectures:** • Filling Systems **Labs/Tutorials:** • Word Processing.	3-4
3	**Lectures:** • Introduction to Computer Network **Labs/Tutorials:** • Application of Network Surfing.	5-6
4	**Lectures:** • Introduction to Data Base. **Labs/Tutorials:** • Access Database.	7-8
5	Midterm	9

6	**Lectures:** - Multimedia & Presentation. **Labs/Tutorials:** - Spreadsheet Theory.	10-12
7	**Lectures:** - General Revision **Labs/Tutorials:** - General Revision	13-15

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x	x	x		x								
	A1.2	x	x		x	x		x	x				x		
	A3.1	x	x		x	x	x		x						
	A3.2	x	x		x			x							
	A3.3	x	x		x		x								x
	A10.1		x		x			x							x
	A10.2		x		x		x								x

6 Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A1.1, A1.2, A3.1, A3.2
2	Practical	A10.1
3	Formative (quizzes- online quizzes)	A1.1, A1.2, A3.1, A3.2,
4	Final Term Examination (written)	A1.1, A1.2, A3.1, A3.2, A10.1, A10.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical	15
3	Formative (quizzes- online quizzes)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Practical	10
3	Formative (quizzes- online quizzes)	20
4	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	"Computers - Timeline of Computer History - Computer History Museum". Retrieved 9 January 2017.
2	Ackerman, Dan (22 August 2013). "Don't buy a new PC or Mac before you read this". CNET. CBS Interactive. Retrieved 5 October 2014.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures:** • Introduction to PC **Labs/Tutorials:** • Operating Systems (DOS – WINDOWS)	1	A1.1
2	**Lectures:** • Filling Systems	1	A3.1

	Labs/Tutorials: - Word Processing.		
3	**Lectures:** - Introduction to Computer Network **Labs/Tutorials:** - Application of Network Surfing.	1	A1.1, A1.2, A10.2
4	**Lectures:** - Introduction to Data Base. **Labs/Tutorials:** - Access Database.	1	A1.1, A1.2, A3.3, A10.2
5	Midterm	1	A1.1, A1.2, A3.3, A10.2
6	**Lectures:** - Multimedia & Presentation. **Labs/Tutorials:** - Spreadsheet Theory.	1	A3.2
7	**Lectures:** - General Revision **Labs/Tutorials:** - General Revision	1	A1.1, A1.2, A3.1, A10.2

Course: “Computers- BSM 025”	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Define the concept of personal computers A1.2 Describe and review of basic computer languages.
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.1 Describe the different word processing tools. A3.2 Develop spreadsheets exercises. A3.3 Compare the different presentation applications.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Prepare different database panes. A10.2 Relate surfing the network

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Define the concept of personal computers A1.2 Describe and review of basic computer languages.
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.1 Describe the different word processing tools. A3.2 Develop spreadsheets exercises. A3.3 Compare the different presentation applications.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Prepare different database panes. A10.2 Relate surfing the network

Course Coordinator: Dr. Ibrahim El-Nahry

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattas

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Construction Engineering Program		
Course Code	HUM 091 / History of Engineering		
Year/ Level	Preparatory Year (Freshman)		
Prerequisite	-----		
Major or minor element of program	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	**--**	**--**

2 Course aims:

No.	aim
1	Apply a wide spectrum of knowledge for society driving engineering developments and engineering developments changing society with the main emphasis placed on developments and changes over the past three hundred years.

3 Learning Outcomes (LOs):

A7.1	Recognize the importance and the evolution of engineering education.
A9.1	Identify the responsibilities and job description of engineers in different positions.
A10.1	Demonstrate the skill of making good communication using internet or brief presentation.
A10.2	Use the internet to communicate and present summaries or opinions.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Definitions: art, science, technology and engineering.	**1-2**
2	**Lectures:** • Relationship between civilizations and natural and social sciences.	**3-4**
3	**Lectures:** • Development of different engineering fields.	**5-6**
4	**Lectures:** • Historical relationship between sciences and technology.	**7-8**
5	**MID-TERM EXAM**	**9**
6	**Lectures:** • The impact of the engineering evolution on societal and economic development.	**10-12**
7	**Lectures:** • Various examples on the aspects of engineering activities.	**13-14**

5 Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture (Online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A7.1	x			x	x						x			
	A9.1	x		x	x	x	x	x				x			
	A10.1	x		x	x	x	x	x				x			
	A10.2	x			x	x			x						

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A7.1, A9.1, A10.1
2	Exercises & Reports	A7.1, A9.1, A10.1, A10.2
3	Formative (quizzes- online quizzes-presentation)	A7.1, A9.1, A10.1, A10.2
4	Final Term Examination (written)	A7.1, A9.1, A10.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Exercises & Reports	Weekly
3	Formative (quizzes- online quizzes-presentation)	6th -11th
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Exercises & Reports	15
3	Formative (quizzes- online quizzes- presentation)	15
4	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	Course notes
2	Essential books (text books) ● مُلاحظات المنهج ● الكُتُب الضرورية (كتب دراسية) ● كتاب تأريخ الهندسة والتكنولوجيا + اسطوانة مدمجة، اعداد أ.د عاطف علم الدين ● تأريخ العلوم و التكنولوجيا الهندسية ● د. أحمد على العريان – عالم الكتب 1996. ● تاريخ العلوم و التكنولوجيا في العصور القديمة و الوسطى ● د. مصطفى محمود سليمان – الهيئة المصرية العامة للكتاب 1995. ● التنمية التكنولوجية مفهومها و متطلباتها ● د. يعقوب فهد العبيد – الدار الدولية للنشر و التوزيع 1989. ● الطاقة لعالم الغد (الحقائق ، و الخيارات الواقعية ، و برنامج للإنجاز) ● لجنة مجلس الطاقة العالمي – الطبعة العربية 1993. • Brain, M. The Engineering Book: From the Catapult to the Curiosity Rover, 250 Milestones in the History of Engineering (Sterling Milestones), 2015

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Reports
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** Definitions: art, science, technology and engineering.	**1**	A7.1, A9.1, A10.1
2	**Lectures:** Relationship between civilizations and natural and social sciences.	**1**	A9.1, A10.2

3	**Lectures:** Development of different engineering fields.	**1**	A9.1, A10.1, A10.2
4	**Lectures:** Historical relationship between sciences and technology.	**1**	A9.1, A10.1, A10.2
5	**MID-TERM EXAM**	**1**	A7.1, A9.1, A10.1
6	**Lectures:** The impact of the engineering evolution on societal and economic development.	**1**	A9.1, A10.1, A10.2
7	**Lectures:** Various examples on the aspects of engineering activities.	**1**	A9.1, A10.1, A10.2

Course: “History of Engineering -HUM 091”	
Program LOs	**Course LOs**
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	**A7.1** Recognize the importance and the evolution of engineering education.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	**A9.1** Identify the responsibilities and job description of engineers in different positions.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	**A10.1** Demonstrate the skill of making good communication using internet or brief presentation. **A10.2** Use the internet to communicate and present summaries or opinions.

Course Coordinator: Prof. Dr. Attef Alam Eldeen

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattas

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Civil Engineering		
Course Code	HUM092 / Technical English I		
Year / Level / Semester	Preparatory Year (Freshman)		
Prerequisite	None		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

2 Course aims:

No.	aim
4	Use techniques, skills, and some English grammar and rules necessary for effectively writing numbers, equations, symbols, and some different types of technical documents such as reports, proposals, letters, and presentations.

3 Learning Outcomes (LOs):

A7-1	Work independently and within a team to prepare different types of technical reports and presentations.
A7-2	Choose the most adequate dictionaries to follow in writing the technical documents.
A8-1	Communicate effectively with colleges to identify the characteristics of a good technical report.
A8-2	Practice the rules and principles of technical writing.
A8-3	Acquire the skills to differentiate between the different types of technical documents reports, proposals, manuals, and presentations.

4 Course Contents:

No.	Topics	Week
1	• Review of English Grammar and Mechanics of Language (Capitalization –Punctuation)	**1-2**
2	• Some characteristics of Technical Language (Abbreviation)	**3**
3	• How to write numbers, units, equations, symbols, and units of measure	**4-5**
4	• Technical words problems: such as jargons, Big words, Wordy phrases, Redundancies, Clichés, Nouns as adjectives, and Misused and troublesome words and phrases	**6-8**
5	• Midterm Exam	**9**

6	• Rules and Principals of technical writing	**10-11**
7	• Good technical writing is…..	**12-13**
9	• Applications of technical writing - Letters - reports - manuals - proposals - presentations	**14**

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture (online-In class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A7-1**	X	X			X		X				X			
	A7-2	X	X			X		X			X	X			
	A8-1	X	X			X									
	A8-2	X				X	X								
	A8-3	X		X	X	X									

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online/offline lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written)	A7-1, A7-2, A8-1, A8-2, A8-3
2	Formative (quizzes - online quizzes - reports)	A7-1, A7-2, A8-1, A8-2, A8-3
3	Final Term Examination (written)	A7-1, A7-2, A8-1, A8-2, A8-3

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (online written)	Week 9
2	Formative (quizzes - online quizzes - reports)	Throughout the semester
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written)	20
2	Formative (quizzes - online quizzes - reports)	30
3	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	D. J. Weatherford, "Technical Writing in Engineering Professions", 2016.
2	Phillip A. Laplante, "Technical Writing: A Practical Guide for Engineers and Scientists", CRC Press, 2nd edition, July 2018.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System Facility
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Review of English Grammar and Mechanics of Language (Capitalization –Punctuation)	4	A7-1, A8-1, A8-2
2	Some characteristics of Technical Language (Abbreviation)	4	A7-1, A8-1, A8-2
3	How to write numbers, units, equations, symbols, and units of measure	4	A7-1, A8-2, A8-3
4	Technical words problems: such as jargons, Big words, Wordy phrases, Redundancies,	4	A7-2, A8-2

	Clichés, Nouns as adjectives, and Misused and troublesome words and phrases		
5	Midterm Exam	4	A7-1, A7-2, A8-1, A8-2, A8-3
6	Rules and Principals of technical writing	4	A7-2, A8-2, A8-3
7	Good technical writing	4	A7-2, A8-2, A8-3
8	Applications of technical writing • letters • reports • manuals • proposals • presentations	4	A7-1, A8-2, A8-3,
9	Final written exam	4	A7-1, A7-2, A8-1, A8-2, A8-3,

Course: "Technical English I - HUM092"	
Program LOs	**Course LOs**
A7- Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	A7-1 Work independently and within a team to prepare different types of technical reports and presentations.
	A7-2 Choose the most adequate dictionaries to follow in writing the technical documents.
A8- Communicate effectively graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Communicate effectively with colleges to identify the characteristics of a good technical report.
	A8-2 Practice the rules and principles of technical writing.
	A8-3 Acquire the skills to differentiate between the different types of technical documents reports, proposals, manuals, and presentations.

Course Coordinator: Dr. Rabab Abdelkader

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP111 Physical and Organic Chemistry**		
Year/ Level	1st Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	-	3

2. Course aims:

No.	Aim
7	Apply analytical, experimental, natural gas engineering processes with proficiency aided by modern engineering tools applied in physical and organic chemistry.

3. Learning Outcomes (LO's):

A2.1.	Define the organic chemistry, basic concepts of organic chemistry, the chemical kinetics, surface chemistry, colloids, and catalysis.
A2.2.	Apply lab work, physical experiments, and organic compounds investigations.
D3.1.	Use the appropriate IUCP system for a writing nomenclature of organic compounds.
D3.2.	Use the appropriate mathematics methods for solving problems.

4. Course Contents:

No.	Topics	Week
1	General layout for chemical kinetics –Density measurements.	1
2	Concept and equations of chemical kinetics – viscosity of liquid measurement.	2
3	Quiz in chemical kinetics + introduction for surface chemistry, adsorption, and absorption. Applications.	3
4	Application of surface chemistry problems- surface tension measurements.	4-5
5	Colloids as a part of surface chemistry, different types, general review for thermodynamics- Boiling point elevation measurement.	6-7

6	General review of colligative properties of solutions, applications-Identification of organic sample.	8
7	Midterm	9
8	Introduction for organic chemistry-covalent bonds & shape of orbitals - Identification of organic sample.	10
9	Alkanes and cycloalkanes, nomenclatures & reactions- Identification of organic sample.	11
10	Functional groups, Alkenes, nomenclature, reactions. Identification of organic sample.	12
11	Alkynes, nomenclature, reactions. Identification of organic sample.	13
12	Aromatics compounds, Benzene, and their derivatives. Identification of organic sample.	14
13	Phenols, nomenclature, reactions. - Lab exam.	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A2.1**	**X**			**X**						**X**				
	A2.1	**X**		**X**	**X**		**X**								**X**
D-Level	**D3.1**	**X**	**X**				**X**							**X**	
	D3.2	**X**	**X**				**X**							**X**	

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A2.1 ,A2.2,D3.1
2	Practical Examination	A2.1,A2.2,D3.1
3	Oral Examination	A2.1
4	Formative (quizzes- online quizzes- presentation)	A2.1,A2.2
5	Final Term Examination (written)	A2.1,A2.2,D3.1,D3.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	10
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	25
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Organic Chemistry 7th (seventh) Edition by Brown, William H., Iverson, Brent L., Anslyn, Eric, Foote, C published by Cengage Learning ,2013.
2	Boer, T. D. J. Physical Organic Chemistry-2: Specially Invited Lectures Presented at the Second IUPAC Conference on Physical Organic Chemistry Held at Noordwijkerhout, Netherlands, Butterworth-Heinemann ,2013.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	General layout for chemical kinetics – Density measurements.	7	A2.1,A2.2
2	Concept and equations of chemical kinetics – viscosity of liquid measurement.	7	A2.1,A2.1,D3.2
3	Quiz in chemical kinetics + introduction for surface chemistry, adsorption, and absorption. Applications.	7	A2.1,D3.2
4	Application of surface chemistry problems-surface tension measurements.	7	A2.1,D3.2,
5	Colloids as a part of surface chemistry, different types, general review for thermodynamics- Boiling point elevation measurement.	7	A2.1,A2.2,D3.2
6	General review of colligative properties of solutions, applications- Identification of organic sample.	7	A2.1,D3.1,D3.2
7	Midterm	7	A2.1 ,A2.2,D3.1
8	Introduction for organic chemistry-covalent bonds & shape of orbitals - Identification of organic sample.	7	A2.1,A2.2,D3.1
9	Alkanes and cycloalkanes, nomenclatures & reactions- Identification of organic sample.	7	A2.1,A2.2,D3.1
10	Functional groups, Alkenes, nomenclature, reactions. Identification of organic sample.	7	A2.1,A2.2,D3.2

11	Alkynes, nomenclature, reactions. Identification of organic sample.	7	A2.1, A2.2
12	Aromatics compounds, Benzene and their derivatives. Identification of organic sample.	7	A2.1, A2.2, D3.2
13	Phenols, nomenclature, reactions. - Lab exam.	7	A2.1. A2.2, D3.1, D3.2

Course: Physical and Organic Chemistry	
Program LO's	**Course LO's**
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1. Define the organic chemistry, basic concepts of organic chemistry, the chemical kinetics, surface chemistry, colloids, and catalysis. A2.2. Apply lab work, physical experiments, and organic compounds investigations.
D3. Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	D3.1. Use the appropriate IUCP system for a writing nomenclature of organic compounds. D3.2. Use the appropriate mathematics methods for solving problems.

Course Coordinator: Dr. Fathia M. Abd-Elrahim.

Program Coordinator: Prof. Dr. Mohamed Bassyouni

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Physics and Mathematical engineering		
Course Code	BSM 111 / Physics II		
Year / Level / Semester	First Level (Sophomore)		
Specialization	Minor		
Prerequisite	Physics I		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	3	-	3

2 Course aims:

No.	aim
1	Describe the modern physics including Quantum theory, Photoelectric effect, Compton effect, Laser, X ray, Super conductivity, Semiconductors and their wide applications in engineering.

3 Learning Outcomes (LOs):

A1.1	Identify basics of modern physics, quantum physics and their application in material science.
A1.2	State the differences between models that describe atomic structure of matters.
A1.3	Outline the differences between solid state materials and their thermal, electrical and crystal structure properties.
A1.4	Recognize natural radioactivity material properties, types of radiation and its detectors.
A2.1	Evaluate the optical properties; Interference, Diffraction and polarization of waves and their applicable techniques.
A2.2	Recognize Laser and X-ray properties and their applications and analyze the I-V characteristic curve of classic Diode and LED.
A2.3	Conduct the essentials of using Electron microscope.
A2.4	Categorize Superconductors types and their application in transportation and industry.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Waves, particles and atomic structure of materials. **Labs:** • Analyze the I-V characteristic curve of classic Diode and LED.	1
2	**Lectures:** • Plank's Quantum Theory - Photoelectric effect, Einstein equation Applications of the Photoelectric Effect - Compton Effect.	2-4

	• De- Broglie Equation - Davisson and Germer experiment. Uncertainty principals. **Labs:** • Determine the breakdown voltage of Zener diode graphically and apply it in voltage regulator circuit.	
3	**Lectures:** • Basic Atomic Structure - Bohr's Atom- Bohr's Postulates - Bohr atomic model • Classical electron - orbital angular momentum • Quantization - Electronic Structure of elements • Pauli Exclusion Principle **Labs:** • Collect characteristics of photodiode experimentally.	5-7
4	**Lectures:** • Electron microscopy and its applications	8
5	Midterm	9
6	**Lectures:** • Laser • X-ray properties and their applications. **Labs:** • Determine the wavelength of laser beam by using diffraction grating.	10-11
7	**Lectures:** • Interference, Diffraction and Polarization • Types of superconductors **Labs:** • Determine absorption coefficient of materials by using Beer's law	12-14
8	**Lectures:** • Natural radioactivity and radiation detectors **Labs:**Final practical examination.	15

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online / in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
	A1.1	**x**	**x**			**x**										

A-Level	**A1.2**	**x**	**x**													
	A1.3	**x**	**x**													
	A1.4	**x**	**x**					**x**								
	A2.1	**x**	**x**			**x**		**x**	**x**							
	A2.2	**x**	**x**					**x**				**x**				
	A2.3	**x**	**x**					**x**				**x**				
	A2.4	**x**	**x**		**x**				**x**							

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3,
2	Practical	A2.1, A2.2, A2.3
3	Oral Examination	A1.1, A1.2, A1.3, A1.4
4	Formative (quizzes- online quizzes- Reports.)	A1.1, A1.2, A1.3, A1.4
5	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Practical/ Oral Examination	10
3	Formative (quizzes- online quizzes- presentation reports)	20
4	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	R.A. Serway and J.W. Jewett, "Physics for Scientists and Engineers", 6th Edition, Thomson Brooks/Cole 2014.
2	Larsen and Keller Education, “Solid State Physics”, June 27, 2019
3	أساسيات الفيزياء – تأليف بوش – الطبعة الخامسة 2011 - ترجمة د. سعيد الجزيرى & د. محمد أمين سليمان.
4	أساسيات الفيزياء الكلاسيكية و المعاصره تأليف د/رأفت كامل واصف – الطبعة الاولى (2011)
5	فيزياء الجوامد – تأليف أ. د. محمد أمين سليمان و أ. د. أحمد فؤاد باشا و أ. د. شريف خيري (2013)
6	Wahab. “Essentials of crystallography” second Edition, Narosa Publishing House, 2014
7	Kittel C.” Introduction to Solid State Physics” Wiley; 8th edition, 2018

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No	Topic	aim	LO's
1	**Lectures:** • Waves, particles and atomic structure of materials. **Labs:** • Analyze the I-V characteristic curve of classic Diode and LED.	1	A1.1, A1.2
2	**Lectures:** • Plank's Quantum Theory - Photoelectric effect, Einstein equation Applications of the Photoelectric Effect - Compton Effect.	1	A1.1, A1.2

	• De- Broglie Equation - Davisson and Germer experiment. Uncertainty principals. **Labs:** • Determine the breakdown voltage of Zener diode graphically and apply it in voltage regulator circuit.		
3	**Lectures:** • Basic Atomic Structure - Bohr's Atom- Bohr's Postulates - Bohr atomic model • Classical electron - orbital angular momentum • Quantization - Electronic Structure of elements • Pauli Exclusion Principle **Labs:** • Collect characteristics of photodiode experimentally.	1	A1.2, A1.3
4	**Lectures:** • Electron microscopy and its applications	1	A2.3
5	Midterm	1	A1.1, A1.2, A1.3, A2.3
6	**Lectures:** • Laser • X-ray properties and their applications. **Labs:** • Determine the wavelength of laser beam by using diffraction grating.	1	A2.1, A2.2
7	**Lectures:** • Interference, Diffraction and Polarization • Types of superconductors **Labs:** Determine absorption coefficient of materials by using Beer's law	1	A2.1, A1.3, A2.4
8	**Lectures:** • Natural radioactivity and radiation detectors **Labs:** • Final practical examination.	1	A1.4

Course: BSM 111 Physics II	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	**A1.1** Identify basics of modern physics, quantum physics and their application in material science. **A1.2** State the differences between models that describe atomic structure of matters. **A1.3** Outline the differences between solid state materials and their thermal, electrical and crystal structure properties. **A1.4** Recognize natural radioactivity material properties, types of radiation and its detectors.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	**A2.1** Evaluate the optical properties; Interference, Diffraction and polarization of waves and their applicable techniques. **A2.2** Recognize Laser and X-ray properties and their applications. **A2.3** Conduct the essentials of using Electron microscope. **A2.4** Categorize Superconductors types and their application in transportation and industry.

Course Coordinator: Dr. Fatma El Sanabary.

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattas

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	BSM 112 / Applied statistics and probability theory		
Year / Level / Semester	First Level (Sophomore)		
Specialization	Minor		
Prerequisite	None		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	2	-

2 Course aims:

No.	Aim
1	Identify the essential knowledge about the fundamental probability and statistics concepts, principles, descriptive statistics, observational studies, experiments, elementary probability, random variables and sampling distributions, summarizing the distribution of variable, graphical displays of variables and determining whether a distribution represents a sample or a population.

3 Learning Outcomes (LOs):

A1.1	Recognize the basic statistical methodology of data analysis including; graphs, descriptive statistics
A1.2	Describe sample spaces and events for random experiments with graphs, tables, lists, or tree diagrams
A1.3	List the probabilities of joint events such as unions and intersections from the probabilities of individual events
A1.4	Recognize the random variables, its distributions, expected value of the random variable, and some special probability distributions including the normal distribution.
A1.5	Show the conditional probabilities of events
A1.6	Distinguish between the different kinds of the independence of events and use dependence to calculate probabilities
A2.1	Practice to solve random variables and its distributions
A2.2	Recognize the Expected value of the random variable
A2.3	Evaluate some special probability distributions -The Normal distribution.
A2.4	Recognize the statistical packages: EXCEL.

4 Course Contents:

No.	Topics	Week
1	**Lectures: Chapter 1** • Basic statistical methodology of data analysis including; graphs, descriptive statistics. • Describe sample spaces and events for random experiments with graphs, tables, lists or tree diagrams.	1-4

	- Elementary data analysis. **Tutorials:** - Describe sample spaces and events for random experiments with graphs. - Graphs descriptive statistics.	
2	**Lectures: Chapter 2** - Basic probability theory. - Combinatorial problems, random variables. - Distributions, expectation. - Calculate the probabilities of joint events such as unions and intersections from the probabilities of individual events. - Studying and calculate the conditional probabilities of events. - Determine the independence of events and use independence to calculate probabilities. **Tutorials:** - Solve the conditional probabilities of events problems.	5-8
3	**Midterm**	9
4	**Lectures: Chapter 3** - Fundamental concepts of statistics. - Random variables and its distributions. - Expected value of the random variable. - Special probability distributions - The normal distribution. **Tutorials:** - Solve conditional probabilities. - Find the Expected value of the random variable.	10-11
5	**Lectures: Chapter 4** - Interpretations of probability, probability definitions and relationships, basic rules for finding probabilities, strategies for finding complicated probabilities. - Discrete random variables, expected value (mean) – standard deviation. - Binomial random variables, continuous random variables - Normal random variables, approximating a binomial random variable using a normal random variable. **Tutorials:** - Solve the problems.	12-15

5 Teaching and Learning Methods:

LO's	**Teaching and Learning Method**														
	Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**

A-Level	**A1.1**	**x**						**x**								
	A1.2	**x**	**x**				**x**									
	A1.3	**x**	**x**			**x**	**x**	**x**								
	A1.4	**x**					**x**									
	A1.5	**x**				**x**	**x**									
	A1.6	**x**					**x**		**x**							
	A2.1	**x**	**x**				**x**	**x**								
	A2.2	**x**					**x**	**x**								
	A2.3	**x**				**x**	**x**	**x**								
	A2.4	**x**	**x**				**x**									

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A1.5
2	Formative (quizzes- online quizzes)	A1.1, A1.2., A1.3, A2.2, A2.3
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A2.2, A2.3, A2.4

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes)	30
3	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	• Walpole, Ronald E., et al. Probability and statistics for engineers and scientists. Vol. 5. New York: Macmillan, 10th Edition 2013
2	• Mendenhall, William, Robert J. Beaver, and Barbara M. Beaver. Introduction to probability and statistics. Cengage Learning, 2th Edition 2015.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Chapter 1** • basic statistical methodology of data analysis including; graphs, descriptive statistics • Describe sample spaces and events for random experiments with graphs, tables, lists or tree diagrams. • Elementary data analysis	1	A1.1, A1.2,
2	**Chapter 2** • Basic probability theory • Combinatorial problems, random variables, • Distributions, expectation • Calculate the probabilities of joint events such as unions and intersections from the probabilities of individual events • Studying and calculate the conditional probabilities of events-	1	A1.3, A1.4, A1.5

	• Determine the independence of events and use independence to calculate probabilities		
3	Midterm	1	A1.1, A1.2, A1.3, A1.4, A1.5
4	**Chapter 3** • Fundamental concepts of statistics. • Random variables and its distributions. • Expected value of the random variable. • Special probability distributions - The normal distribution.	1	A1.6, A2.1
5	**Chapter 4** • Interpretations of probability, probability definitions and relationships, basic rules for finding probabilities, strategies for finding complicated probabilities • Discrete random variables, expected value (mean) – standard deviation,- • Binomial random variables, continuous random variables • Normal random variables, approximating a binomial random variable using a normal random variable	1	A2.2, A2.3, A2.4

<table>
<tr><th colspan="2">Course: BSM 112 Statistics and Probability</th></tr>
<tr><th>Program LOs</th><th>Course LOs</th></tr>
<tr><td>A1. Identify formulates and solves complex engineering problems by applying engineering fundamentals, basic science and mathematics.</td><td>A1.1 Recognize the basic statistical methodology of data analysis including; graphs, descriptive statistics
A1.2 Describe sample spaces and events for random experiments with graphs, tables, lists, or tree diagrams
A1.3 List the probabilities of joint events such as unions and intersections from the probabilities of individual events
A1.4 Recognize the random variables, its distributions, expected value of the random variable, and some special probability distributions including the normal distribution.
A1.5 Show the conditional probabilities of events</td></tr>
</table>

	A.1.6 Distinguish between the different kinds of the independence of events and use dependence to calculate probabilities
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings and use statistical analyses and objective engineering judgment to draw conclusions.	**A2.1** Practice to solve random variables and its distributions **A2.2** Recognize the Expected value of the random variable **A2.3** Evaluate Some special probability distributions - The Normal distribution. **A2.4** Recognize the statistical packages: EXCEL.

Course Coordinator: Dr. Moanis Moaz

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattas

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	B. Sc. in Construction Engineering		
Department offering the Program	Civil Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	BSM 113 / **Numerical Analysis**		
Year / Level / Semester	First Level (Sophomore)		
Specialization	Minor		
Prerequisite	Mathematics II		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	--	3

2 Course aims:

No.	**Aim**
1	Identify the essential knowledge about basic concepts and methods of numerical analysis to develop numerical methods aided by technology to solve algebraic, transcendental, differential equations to calculate derivatives and integrals. Also, develop recognize the elements of error analysis for numerical methods and certain proofs. The course will further develop problem solving skills.

3 Learning Outcomes (LOs):

A1.1	Define the roots using bisection, linear interpolation, Secant and/or Newton's methods.
A1.2	Categorize the appropriate numerical method.
A1.3	Distinguish between the different between the double Integral and the triple Integral.
A1.4	Identify the different between the numerical Integration.
A1.5	Solve multiple integrals in any other area.
A1.6	Recognize the different between the Maximum and minimum of function of two Variables.
A2.1	Apply the different methods to solve the first differential equations.
A2.2	Solve a linear system of equations using an appropriate numerical method.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** Chapter 1: Numerical analysis theory • Roots using bisection, linear interpolation, Secant and Newton's methods. • Select a function using an appropriate numerical method. • Practice of the equations by trial-and-error method. **Tutorials:** • Apply the definition to find roots. • Practice of solving equations.	1-3
2	**Lectures:** Chapter 2: Interpolation and extrapolation • Divided difference method. • Newton forward and backward theorem. • Lagrangian polynomials. • Maximum and minimum of a function of two variables. **Tutorials:** • Apply the different methods to find Interpolation	4-5
3	**Lectures:** Chapter 3: Numerical Integration • Trapezoidal • Simpsons • Simpson 3 over 8 **Tutorials:** • Evaluate the Numerical Integration • Solve integrals in any other area.	6-8
4	**Mid Term**	9
5	**Lectures:** Chapter 4: Matrix types and properties. • Numerical Matrix analysis • Multiply of matrix • summation of matrix • Inverse matrix. **Tutorials:** • Apply the basic definition of matrix. • Use the text- books to solve some problems and collect some data.	10
6	**Lectures:** Chapter 5: Numerical solution of set of linear equations • Gauss elimination • Gauss Seidel. • Jacobi method **Tutorials:** • Evaluate the solution of set of linear equations.	11-12
7	**Lectures:** Chapter 5: numerical solution of ordinary differential equation Euler's **Tutorials:** • Solve ordinary differential equation.	13-14

5 Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (Online/offline)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x													
	A1.2	x	x				x									
	A1.3	x	x	x			x									
	A1.4	x					x									
	A1.5	x	x	x			x	x								
	A1.6	x	x	x			x	x								
	A2.1	x	x				x	x								
	A2.2	x	x				x									
	A2.3	x		x			x	x								
	A2.4	x		x			x									

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3 , A1.6, A2.3, A2.3, A1.4, A1,5
2	Formative (quizzes- online quizzes- presentation - …….)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A2.1 , A2.2, A2.3, A2.4
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A2.1, A2.2, A2.3, A2.4.

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes- presentation - …….)	30
3	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	Steven C. Chapra, *Numerical Methods for Engineers*, 8th Ed., McGraw Hill, 2015
2	George W. Collins, “Fundamental Numerical Methods and Data Analysis”, 2003.
3	John H. Mathews and Kurtis D. Fink, Numerical Methods using Matlab, 9th Ed., Pearson , Prentice Hall, 2014
4	Mendenhall, William, Robert J. Beaver, and Barbara M. Beaver. *Introduction to probability and statistics*. Cengage Learning, 2012

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Lectures:** Chapter 1: Numerical analysis theory • Roots using bisection, linear interpolation, Secant and Newton’s methods • Select a function using an appropriate numerical method.	1	A1.1, A1.2, A2.3

	• Practice of the equations by trial-and-error method. **Tutorials:** • Apply the definition to find roots. • Practice of solving equations.		
2	**Lectures:** Chapter 2: Interpolation and extrapolation • Divided difference method. • Newton forward and backward theorem • Lagrangian polynomials. • Maximum and minimum of a function of two variables. **Tutorials:** • Apply the different methods to find Interpolation	1	A1.6, A2.3
3	**Lectures:** Chapter 3: Numerical Integration • Trapezoidal • Simpsons • Simpsons 3 over 8 **Tutorials:** • Evaluate the Numerical Integration • Solve integrals in any other area.	1	A1.3, A1.4, A1.5, A2.4, A2.3
4	**Mid Term**	1	A1.1, A1.2, A1.3 , A1.6, A2.3, A2.3, A1.4, A1,5
5	**Lectures:** Chapter 4: Matrix types and properties. • Numerical Matrix analysis • Multiply of matrix • summation of matrix • Inverse matrix. **Tutorials:** • Apply the basic definition of matrix. • Use the text- books to solve some problems and collect some data.	1	A2.4
6	**Lectures:** Chapter 5: Numerical solution of set of linear equations • Gauss elimination • Gauss Seidel. • Jacobi method **Tutorials:** • Evaluate the solution of set of linear equations.	1	A2.1, A2.2
7	**Lectures:** Chapter 5: numerical solution of ordinary differential equation. • Euler's **Tutorials:** • Solve ordinary differential equation.	1	A2.1, A2.3

Course: "Numerical Analysis- BSM 113"	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Define the roots using bisection, linear interpolation, Secant and/or Newton's methods. A1.2 Categorize the appropriate numerical method. A1.3 Distinguish between the different between the double Integral and the triple Integral. A1.4 Identify the different between the numerical Integration. A1.5 Solve multiple integrals in any other area. A1.6 Recognize the different between the Maximum and minimum of function of two Variables.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and Interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Apply the different methods to solve the first differential equations. A2.2 Solve a linear system of equations using an appropriate numerical method. A2-3 Estimate an error analysis for a given numerical method. A2.4 Solve particular problems.

Course Coordinator: Dr. Youssef Aly Mohamed Baghdadi

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Civil Engineering		
Course Code	BSM 115 / **Properties and strength of materials**		
Year / Level / Semester	First Level (Sophomore)		
Specialization	Major		
Prerequisite	Production Technology		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	--	3

2 Course aims:

No.	**aim**
1	Apply engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify the properties and strength of materials according to mechanical properties of materials.

3 Learning Outcomes (LOs):

A1.1	Define the mechanical properties of materials
A1.2	Define sectional mechanical properties.
A2.1	Recognize normal stress
A2.2	Identify the shear stresses and torsion
A 2.3	Recognize the combined stress due to normal and shear stresses.
D1.1	Collaborate effectively within multi-disciplinary team to calculate the various stresses of a structure elements
D1.2	Collaborate effectively within multidisciplinary team to calculate the normal and shear stresses

4 Course Contents:

No.	**Topics**	**Week**
1	**Lectures** • Mechanical properties of materials. **Tutorials** • Review the mechanical properties of materials	**1**
2	**Lectures** • Symmetrical section properties. **Tutorial** • Practice on the symmetrical section properties	**2**
3	**Lectures** • Un-symmetrical section properties. **Tutorial/Labs** • Practice on the un- symmetrical section properties	**3-4**

4	**Lectures** • Normal stress on section due to normal force only. **Tutorial/Labs** • Review and practice on normal stress on section due to normal force only.	**5**
5	**Lectures** • Normal stress on section due to moments. **Tutorial/Labs** • Review and practice on normal stress on section due to moments	**6-7**
6	**Lectures** • Normal stress on section due to bi-axial forces. **Tutorial/Labs** • Review and practice on normal stress on section due to bi-axial forces.	**8**
7	**Midterm**	**9**
8	**Lectures** • Shear stresses due to direct shear. **Tutorial/Labs** • Review and practice on shear stresses due to direct shear.	**10**
9	**Lectures** • Shear stresses on section. **Tutorial/Labs** • Review and practice on shear stresses on section •	**11**
10	**Lectures** • Combined stresses due to normal and shear stresses. **Tutorial/Labs** • Review and practice on combined stresses due to normal and shear stresses.	**12-13**
11	**Lectures** • Shear stress due to torsion. **Tutorial/Labs** • Review and practice on Shear stress due to torsion.	**14**

5 Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (Online/offline)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x			x	x	x		x							
	A1.2	x			x		x	x								
	A2.1	x			x		x	x								
	A2.2	x			x	x	x	x	x							
	A 2.3	x			x		x	x								
D-Level	D1.1	x			x		x	x				x	x		x	x
	D1.2	x			x		x									x

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	Los
1	Mid Term Examination (written/ online)	A1.1, A1.2,A2.1,A2.2,A2.3
2	Practical/ Oral Examination	A1.1, A1.2, ,A2.3.D1.1,D1.2
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	A1.1, A1.2,A2.1,A2.2,A2.3.D1.1,D1.2
4	Final Term Examination (written)	A1.1, A1.2,A2.1,A2.2,A2.3, D1.1,D1.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	**20**
2	Practical/ Oral Examination	**10**
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	**20**
4	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	R.C. Hibbeler, "Structural Analysis", Eighth Edition, Published by Pearson Prentice Hall, USA, **2012**.
2	Problem oriented text in Structural analysis and Mechanics I, II Bazaraa, A. S. Structural Mechanics Michel Bakhoum Volume 1.
	Russell C Hibbeler; Kai Beng Yap, “Mechanics of materials”, Harlow Pearson [**2018**]
3	El-Dakhakhni, W. M. (**1983**) "Theory of Structures – Part 2", 3rd Ed., Dar Al-Maaref.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Lectures** • Mechanical properties of materials. **Tutorials** • Review the mechanical properties of materials	**1**	A1.1, A1.2
2	**Lectures** • Symmetrical section properties. **Tutorial** • Practice on the symmetrical section properties	**1**	A1.1, A1.2,A2.1
3	**Lectures** • Un-symmetrical section properties. **Tutorial/Labs** • Practice on the un- symmetrical section properties	**1**	A1.1, A1.2,A2.1
4	**Lectures** • Normal stress on section due to normal force only. **Tutorial/Labs** • Review and practice on normal stress on section due to normal force only.	**1**	A1.1, A1.2,A2.1,A2.2
5	**Lectures** • Normal stress on section due to moments. **Tutorial/Labs** • Review and practice on normal stress on section due to moments	**1**	A1.1, A1.2,A2.1,A2.2,A2.3,
6	**Lectures** • Normal stress on section due to bi-axial forces. **Tutorial/Labs** • Review and practice on normal stress on section due to bi-axial forces.	**1**	A1.1, A1.2,A2.1,A2.2,A2.3,
7	**Midterm**	**1**	A1.1, A1.2,A2.1,A2.2,A2.3
9	**Lectures** • Shear stresses due to direct shear. **Tutorial/Labs** • Review and practice on shear stresses due to direct shear.	**1**	A1.1, A1.2,A2.1,A2.2,A2.3, D1.1,D1.2
10	**Lectures** • Shear stresses on section. **Tutorial/Labs**	**1**	A1.1, A1.2,A2.1,A2.2,A2.3, D1.1,D1.2

	- Review and practice on shear stresses on section		
11	**Lectures** - Combined stresses due to normal and shear stresses. **Tutorial/Labs** - Review and practice on combined stresses due to normal and shear stresses.	**1**	A1.1, A1.2,A2.1,A2.2,A2.3, D1.1,D1.2
12	**Lectures** - Shear stress due to torsion. **Tutorial/Labs** - Review and practice on Shear stress due to torsion.	**1**	A1.1, A1.2,A2.1,A2.2,A2.3, D1.1,D1.2

Course: "Properties and strength of materials - BSM 115 "	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	**A1.1** Define the mechanical properties of materials. **A1.2** Define sectional mechanical properties.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	**A2.1** Recognize normal stress. **A2.2** Identify the shear stresses and torsion **A2.3** Recognize the combined stress due to normal and shear stresses.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Surveying, Measurements, and Mechanical and Electrical Design.	**D1.1** Collaborate effectively within multi-disciplinary team to calculate the various stresses of a structure elements. **D1.2** Collaborate effectively within multidisciplinary team to calculate the normal and shear stresses.
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	**A1.1** Define the mechanical properties of materials **A1.2** Define sectional mechanical properties.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	**A2.1** Recognize normal stress. **A2.2** Identify the shear stresses and torsion **A2.3** Recognize the combined stress due to normal and shear stresses.

Course Coordinator: Dr. Gamal M. H. Galal

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Chemical Engineering		
Course Code	HUM 191 / **Technical English Language II**		
Year / Level / Semester	First Level (Sophomore)		
Prerequisite	Technical English Language I		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

2 Course aims:

No.	aim
4	Use techniques, skills, and some pattern of technical English sentences - sentence structure required for technical manuscript and reports following different writing styles.

3 Learning Outcomes (LOs):

A7	Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.
A8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
D6	Prepare and present technical language and report writing.

4 Course Contents:

No.	Topics	Week
1	• An Introduction to Technical Communication	**1**
2	• The Communication Process	**2**
3	• Objectives in Technical Communication and Audience Recognition	**3-4**
4	• Ethical Considerations and Research writing process	**5-7**
5	• Mid-term Exam	**8**
6	• Routine Correspondence: memos, letters, e-mail, instant messages, and text messages	**9-11**
7	• Types of Social media: blogging, YouTube, Twitter and Facebook	**12**
8	• Job research (Research Yourself, Research the Company and Research the Position)	**13**
9	• Document Design: Organization, Order, Access and Variety	**14**

5 Teaching and Learning Methods:

LO’s		Teaching and Learning Method														
		Lecture (Online/offline)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	**A7-1**		x		x	x			x	x		x	x			
	A7-2		x		x	x			x	x		x	x			
	A8-1	x	x		x	x			x				x			
	A8-2	x	x		x											
	A8-3	x	x		x											
	A8-4	x	x		x											
	A8-5		x		x							x	x			
D-Level	**D6-1**	x	x		x				x							
	D6-2	x	x		x	x			x			x	x			
	A7-1		x		x	x			x	x		x	x			

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online/offline lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written)	A8-1, A8-2, A8-3
2	Formative (quizzes - online quizzes - reports)	A7-1, A7-2, A8-3, A8-4, A8-5,
3	Final Term Examination (written)	A8-4, A8-5, D6-1, D6-2,

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written)	8
2	Formative (quizzes - online quizzes - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written)	**20**
2	Formative (quizzes - online quizzes - reports)	**30**
3	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	Sharon Gerson, Steven Gerson, *Technical Communication: Process and Product* (8th Edition), 2014
2	D. J. Weatherford, “Technical Writing in Engineering Professions“, 2016.
3	Phillip A. Laplante, “Technical Writing: A Practical Guide for Engineers and Scientists”, CRC Press, 2nd edition, July 2018.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System Facility
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	• An Introduction to Technical Communication	**4**	A8-1
2	• The Communication Process	**4**	A7-1, A8-2, A8-4, D6-1
3	• Objectives in Technical Communication and Audience Recognition	**4**	A7-2, A8-2, A8-4, D6-2
4	• Ethical Considerations and Research writing process	**4**	A8-2, A8-4, A10-1
5	• Mid-term Exam	**4**	A8-1, A8-2, A8-3, A8-5,

6	• Routine Correspondence: memos, letters, e-mail, instant messages, and text messages	**4**	A10-1, A10-2
7	• Types of Social media: blogging, YouTube, Twitter and Facebook	**4**	A8-1, A8-3, A8-4, A10-1, A7-1, A7-2
9	• Job research (Research Yourself, Research the Company and Research the Position)	**4**	A8-3, A8-4, A7-1, A7-2

Course: “Technical English Language II – HUM 191”	
Program LOs	**Course Los**
A7 - Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	A7-1 Integrate effectively with multidisciplinary teams.
	A7-2 Classify technical communication skills.
A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Identify the importance and usage of different types of technical report for engineers.
	A8-2 Recognize the differences between the different sections of technical reports.
	A8-3 prepare accurate, clear, efficient, and comprehensive engineering technical report.
	A8-4 Presents accurate, clear, efficient, and comprehensive engineering technical report.
	A8-5 Explore different ideas, views, and knowledge from a range of sources to organize, collect, analyze, and evaluate information for writing a technical report.
D6- Prepare and present technical language and report writing.	D6-1 Refer to various literatures regarding writing styles and rules.
	D6-2 Practice writing the list of references in a different format.

Course Coordinator Prof. Mohamed Bassyouni

Program Coordinator: Assoc. Prof. Mohamed Bassyouni

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	NGEP		
Course Code	**NGP 121 General Geology**		
Year/ Level	1st Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	-	3

2. Course aims:

No.	**Aim**
1	Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking in different geological environments.

3. Learning Outcomes (LO's):

A1.1.	Use the appropriate geological structural system forming certain type of rocks.
A2.1.	Evaluate the design results according to the condition of slope and materials forming it and degree of slope.
A4.1.	Describe the ways and genesis forming different rocks such as igneous, metamorphic, and sedimentary.
A5.1.	Practice research techniques and methods of investigation in geology
D2.1.	Design and draw details of cut and fill of slope stabilization.

4. Course Contents:

No.	**Topics**	**Week**
1	The Earth - Surface and Interior	1
2	Igneous rocks- Sedimentary rocks (clastics rocks)- Sedimentary rocks (Non-clastics rocks) and Metamorphic rocks	2-4
3	Structure Geology (Faults)- structure Geology (Folds)	5-6
4	Petrophysical property (Porosity)	7
5	Midterm Exam	8
6	Petrophysical property (permeability)	9
7	Sedimentary environments (Terrestrial)- Sedimentary environments (marine)	10-11

8	Slope sterilization (Cut)- Slope sterilization (Fill)	12-13
9	Retaining walls (structures)	14
10	Review – lab exam	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	**X**		**X**											
	A2.1	**X**		**X**											**X**
	A4.1	**X**			**X**		**X**				**X**				**X**
	A5.1	**X**	**X**		**X**		**X**				**X**				
D-Level	**D2.1**	**X**	**X**				**X**								**X**

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LO's**
1	Mid Term Examination (written/ online)	A1.1,A2.1,A4.1,D2.1
2	Practical Examination	A2.1,A5.1
3	Oral Examination	A4.1
4	Formative (quizzes-online-quizzes-presentation)	A1.1,A4.1,A5.1
5	Final Term Examination (written)	A1.1,A2.1,A4.1,A5.1,D2.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	10
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	25
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Duncan, M. J., Wright, S. G., & Brandon, T. L. Soil Strength and Slope Stability (2nd ed.). Wiley (2014).
2	An Introduction to Geology, Chris Johnson, Matthew D. Affolter, Paul Inkenbrandt, Cam Mosher Salt Lake Community College – 2017

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	The Earth - Surface and Interior	1	A1.1,A2.1
2	Igneous rocks- Sedimentary rocks (clastics rocks)- Sedimentary rocks (Non-clastics rocks) and Metamorphic rocks	1	A2.1,A4.1,A5.1
3	Structure Geology (Faults)- structure Geology (Folds)	1	A1.1,A2.1,A5.1,B2.1
4	Petrophysical property (Porosity)	1	A4.1,A4.1,B2.1
5	Midterm Exam	1	A1.1,A21,A4.1,D2.1
6	Petrophysical property (permeability)	1	A2.1,A4.1,A5.1
7	Sedimentary environments (Terrestrial)- Sedimentary environments (marine)	1	A1.1,A5.1,B2.1
8	Slope sterilization (Cut)- Slope sterilization (Fill)	1	A2.1,A4.1,A5.1,D2.1
9	Retaining walls (structures)	1	A1.1,A5.1
10	Review – lab exam	1	A1.1, A4.1,A5.1, D2.1

Course: General Geology	
Program LO's	**Course LO's**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1. Use the appropriate geological structural system forming certain type of rocks.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1. Evaluate the design results according to the condition of slope and materials forming it and degree of slope.

A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1. Describe the ways and genesis forming different rocks such as igneous, metamorphic, and sedimentary.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1Practice research techniques and methods of investigation in geology
D2. Demonstrate knowledge, understanding, and utilization of plane and topographical surveying techniques, processes and equipment, photogrammetry, and the Global Positioning system (GPS) in engineering projects.	D2.1. Design and draw details of cut and fill of slope stabilization.

Course Coordinator: Dr. Tamer El Said Attia.

Program Coordinator: Prof.Dr. Mohamed Bassyouni

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Production Engineering & Mechanical Design		
Course Code	**NGP123 Drawing and Elements of Machine Design**		
Year/ Level	1st Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	3

2. Course aims:

No.	Aim
6	Act professionally in design and supervision of machine design.
7	Apply analytical, experimental, design with proficiency aided by modern engineering tools in engineering materials in machine element design.

3. Learning Outcomes (LO's):

A1.1.	Describe and solve engineering problems and ask for different workable solutions.
D3.1.	Analyze the status of newly designed element to monitor its behavior to avoid any errors in the forthcoming design.
D11.1.	Investigate and record the status of elements that have failed (or prone to fail) as history that can be used in modern design.
D18.1	Design of ;Fasteners ,shafts and axels , cotter joint and couplings , welded joints , Power screws , Riveted joints, and design considerations.

4. Course Contents:

No.	Topics	Week
1	Machine design and design considerations	1
2	Engineering materials in machine element design	2
3	Simple and compound stresses	3
4	Dynamic stresses and	4-5
5	Theories of failure	6
6	Design of Fasteners	7-8
7	Mid-Term Exam	9
8	Design of shafts, axels, cotter joint and couplings	10-12

9	Design of welded joints, Power screws, Riveted joints	13-14
10	Machine design and design considerations	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	X		X			X								
D-Level	**D3.1**	X	X	X	X		X							X	
	D11.1	X	X	X			X								
	D18.1	X		X			X								

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A1.1 ,D11.1
2	Practical Examination	D3.1,D11.1,D18.1
3	Oral Examination	A1.1,D3.1
4	Formative (quizzes- online quizzes- presentation)	A1.1,D3.1,D11.1,
5	Final Term Examination (written)	A1.1,D3.1,D11.1,D18.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	10
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	25
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	R.S. Khurmi, J.K. Gupta. A textbook of Machine Design, Eurasia publishing, 37th. Edition, 2010.
2	Budynas, R., & Nisbett, K. Shigley’s Mechanical Engineering Design (McGraw-Hill Series in Mechanical Engineering) (10th ed.). McGraw-Hill Education (2014).
3	Ugural, A. C. Mechanical Design of Machine Components: SI Version (2nd ed.). Taylor & Francis. (2016).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Machine design and design considerations	6	A1.1,D18.1
2	Engineering materials in machine element design	6	A1.1,D11.1,D18.1
3	Simple and compound stresses	7	A1.1,D3.1
4	Dynamic stresses and	7	A1.1,D3.1
5	Theories of failure	7	A1.1.D3.1,D11.1
6	Design of Fasteners	7	D3.1,D1.1
7	Mid-Term Exam	6	A1.1 ,D11.1
8	Design of shafts, axels, cotter joint and couplings	6	A1.1,D3.1,D11.1
9	Design of welded joints, Power screws, Riveted joints	6	D3.1,D11.1,D18.1
10	Machine design and design considerations	6	A1.1,D18.1

Course: Drawing and Elements of Machine Design	
Program LO's	**Course LO's**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1. Describe and solve engineering problems and ask for different workable solutions.
D3. Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	D3.1. Analyze the status of newly designed element to monitor its behavior to avoid any errors in the forthcoming design.
D11. Practice the neatness and aesthetics in design and approach.	D11.1. Investigate and record the status of elements that have failed (or prone to fail) as history that can be used in modern design.
D18. Evaluate and appraise designs, processes (operations), equipment and machinery, and propose improvements.	D18.1. Design of ;Fasteners ,shafts and axels , cotter joint and couplings , welded joints , Power screws , Riveted joints, and design considerations.

Course Coordinator: Dr. Hassan M. Abd El Hafez

Program Coordinator: Prof. Dr. Mohamed Bassyouni

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Electrical Engineering Depart.		
Course Code	BSM 121 / Computers and Programming		
Year / Level / Semester	First Level (Sophomore)		
Specialization	Major		
Prerequisite	Computers		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	2	3

2 Course aims:

No.	aim
4	Use techniques, skills, and modern engineering tools necessary for basics of programming using MATLAB.

3 Learning Outcomes (LOs):

A1.1	Programming concept.
A1.2	Simple and compound statements.
A3.1	Select the suitable model for different computer problems based on the analysis.
A3.2	Design simple programs.
A5.1	Execute MATLAB codes.
D4.1	Collaborate effectively within multi-disciplinary team to calculate appropriate software

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • MATLAB Desktop, m file. **Labs/Tutorials:** • Review MATLAB Desktop, m file.	**1**
2	**Lectures:** • Arithmetic operations, constant and variables. **Labs/Tutorials:** • Practice Arithmetic operations, constant and variables.	**2**
3	**Lectures:** • Matrices arithmetic operations. **Labs/Tutorials:** • Practice Matrices arithmetic operations.	**3**
4	**Lectures:** • The colon notations. **Labs/Tutorials:**	**4**

	• Practice the colon notations.	
5	**Lectures:** • Logical operators, If statement. **Labs/Tutorials:** • Practice Logical operators, If statement.	**5**
6	**Lectures:** • Loops: for loops. **Labs/Tutorials:** • Practice Loops: for loops.	**6**
7	**Lectures:** • Loops: for loops. **Labs/Tutorials:** • Practice Loops: for loops.	**7**
8	**Lectures:** • Loops: while loops, do-while loops. **Labs/Tutorials:** • Practice Loops: while loops, do-while loops.	**8**
9	**Midterm**	**9**
10	**Lectures:** • Numerical analysis examples – part1. **Labs/Tutorials:** • Practice Numerical analysis examples – part1	**10**
11	**Lectures:** • Numerical analysis examples – part2. **Labs/Tutorials:** • Practice Numerical analysis examples – part2	**11**
12	**Lectures:** • Functions. **Labs/Tutorials:** • Practice Functions	**12**
13	**Lectures:** • Plotting. **Labs/Tutorials:** • Practice Plotting	**13**
14	**Lectures:** • Revision. **Labs/Tutorials:** • **Quiz**	**14**

5 Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (Online/offline)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x			x	x	x		x							
	A1.2	x			x		x	x								
	A3.1		x			x	x	x		x						
	A3.2	x			x	x	x		x							
D-Level	A5.1		x			x	x	x		x						
	D4.1	x				x		x					x	x		

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A5.1
2	Practical/ Oral Examination	A1.1, A1.2, A5.1
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	A1.1, A1.2, A3.1, A3.2
4	Final Term Examination (written)	A1.1, A1.2, A3.1, A3.2, A5.1, D4.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	**20**
2	Practical/ Oral Examination	**10**
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	**20**
4	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	A.K. Hartmann, Practical Guide to Computer Simulations, Singapore: World Scientific (2009).
2	Hunt, D. Thomas, and W. Cunningham, The Pragmatic Programmer. From Journeyman to Master, Amsterdam: Addison-Wesley Longman (1999)
3	Brian W. Kernighan, The Practice of Programming, Pearson (1999)
4	Warren S Seames , Computer numerical control : concepts and programming, Albany, NY : Delmar Thomson Learning, 2002.
5	Stormy Attaway, MATLAB a practical introduction to programming and problem solving by Amsterdam Butterworth-Heinemann [2019].

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Lectures:** • MATLAB Desktop, m file. **Labs/Tutorials:** • Review MATLAB Desktop, m file.	**4**	A3.1, A3.2
2	**Lectures:** • Arithmetic operations, constant and variables. **Labs/Tutorials:** • Practice Arithmetic operations, constant and variables.	**4**	A4.1, A3.2
3	**Lectures:** • Matrices arithmetic operations. **Labs/Tutorials:** • Practice Matrices arithmetic operations.	**4**	A1.1,A1.2
4	**Lectures:** • The colon notations. **Labs/Tutorials:** • Practice the colon notations.	**4**	A1.1,A1.2,A5.1
5	**Lectures:** • Logical operators, If statement. **Labs/Tutorials:** • Practice Logical operators, If statement.	**4**	A1.1,A1.2,A5.1
6	**Lectures:** • Loops: for loops. **Labs/Tutorials:** • Practice Loops: for loops.	**4**	A1.1,A1.2,A5.1
7	**Lectures:** • Loops: for loops. **Labs/Tutorials:** • Practice Loops: for loops.	**4**	A1.1,A1.2,A5.1
8	**Lectures:** • Loops: while loops, do-while loops. **Labs/Tutorials:** • Practice Loops: while loops, do-while loops.	**4**	A1.1,A1.2,A5.1
9	**Midterm**	**4**	A1.1,A1.2,A5.1
10	**Lectures:** • Numerical analysis examples – part1. **Labs/Tutorials:** • Practice Numerical analysis examples – part1	**4**	A1.1,A1.2,A5.1,D4.1

11	**Lectures:** • Numerical analysis examples – part2. **Labs/Tutorials:** • Practice Numerical analysis examples – part2	**4**	A1.1, A5.1, D4.1
12	**Lectures:** • Functions. **Labs/Tutorials:** • Practice Functions	**4**	A1.1, A1.2, D4.1
13	**Lectures:** • Plotting. **Labs/Tutorials:** • Practice Plotting	**4**	A1.2, A5.1,D4.1
14	**Lectures:** • Revision. **Labs/Tutorials:** • **Quiz**	**4**	A1.1, A5.1, D4.1

Course: “Computers and Programming- BSM 121”	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	**A1.1** Programming concept. **A1.2** Simple and compound statements.
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	**A3.1** Select the suitable model for different computer problems based on the analysis. **A3.2** Design simple programs
A5. Practice research techniques and methods of investigation as an inherent part of learning.	**A5.1** Execute MATLAB codes.
D4. Demonstrate additional abilities to select appropriate system, analyze, and design using the most up-to-date analytical tools, techniques, equipment, and software packages.	**D4.1** Collaborate effectively within multi-disciplinary team to calculate appropriate software

Course Coordinator: Prof. Dr. Rawya Yehia Rizk

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	NGEP		
Course Code	**NGP122 Introduction to oil and Gas Engineering**		
Year/ Level	1st Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
7	Apply analytical, experimental, design, oil and natural gas engineering processes with proficiency aided by modern engineering tools.

3. Learning Outcomes (LO's):

A4.1.	Apply technique for oil / gas separation.
A4.2.	Develop methods for gas restoration.
D16.1.	Compare the different methods for Condensate Stabilization, gas dehydration & Hydrate Prediction and Prevention.
D16.2.	Recognize the exploration technology, Manifolds and gathering.

4. Course Contents:

No.	Topics	Week
1	Introduction to oil and gas Engineering.	1
2	Exploration technology.	2
3	Introduction to oil and gas production.	3-4
4	Manifolds and gathering.	5
5	Oil gas separation.	6-7
6	Oil Storage and Sales.	8
7	Midterm exam	9
8	Introduction to gas dehydration	10-11
9	Hydrate Prediction and Prevention	12-14
10	General Revision	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A4.1**	X		X	X	X	X								
	A4.2	X	X	X	X	X	X								
D-Level	**D16.1**	X	X			X	X								
	D16.2	X				X	X								

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A4.1,A4.2,D16.1
2	Practical Examination	-
3	Oral Examination	D16.1,D16.2
4	Formative (quizzes- online quizzes-presentation)	A4.1,A4.2,D16.1,D16.2
5	Final Term Examination (written)	A4.1,A4.2,D16.1,D16.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	An Introduction to Oil and Gas Production, Olé Hansen, 2nd edition, 2019
2	Palmer, A. C. Introduction to Petroleum Exploration and Engineering. Wspc. (2016).
3	Devold, H. Oil and Gas Production Handbook: An Introduction to Oil and Gas Production, Transport, Refining and Petrochemical Industry (null ed.) (2015).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction to oil and gas Engineering.	7	A4.1,A4.2
2	Exploration technology.	7	A4.1,D16.1,D16.2
3	Introduction to oil and gas production.	7	A4.1,A4.2

4	Manifolds and gathering.	7	A4.1.D16.1
5	Oil gas separation.	7	A4.1,A4.2,D16.1
6	Oil Storage and Sales.	7	A4.1,A4.2,D16.2
7	Midterm exam	7	A4.1,A4.2,D16.1
8	Introduction to gas dehydration	7	A4.2,D16.2
9	Hydrate Prediction and Prevention	7	A4.1,D16.1,D16.2
10	General Revision	7	A4.1,A4.2,D16.1,D16.2

Course: Introduction to oil and Gas Engineering	
Program LO's	**Course LO's**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1. Apply technique for oil / gas separation. A4.2. Develop methods for gas restoration.
D16. Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer.	D16.1 Compare the different methods for Condensate Stabilization, gas dehydration & Hydrate Prediction and Prevention. D16.2 Recognize the exploration technology, Manifolds and gathering.

Course Coordinator: Dr. Ashraf Abdel Karim Hussein

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Mechanical Power Engineering		
Course Code	BSM 123 / Fluid Mechanics		
Year / Level / Semester	First Level (Sophomore)		
Specialization	Minor		
Prerequisite	Mechanics II		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	--	3

2 Course aims:

No.	Aim
1	Apply engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve fluid mechanics engineering problems in real life.

3 Learning Outcomes (LOs):

A1.1	Define the concepts of physical meaning and phenomena are used in fluid mechanics.
A1.2	Analyze the theories of mathematics and sciences are used for fluid mechanics.
D1.1	Analyze the engineering problems are used in fluid mechanics.
D1.2	Study the general laws of flow related to the fluid from different sources.
D3.1	Write the reports in accordance with the standard scientific guidelines.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Concepts and definitions **Labs/Tutorials:** • Review the basics concepts and units.	**1**
2	**Lectures:** • Fluid static **Labs/Tutorials:** • Solve problems on fluid statics.	**2**
3	**Lectures:** • Forces on submerged surfaces and bodies • Non-viscous flow **Labs/Tutorials:** • Solve problems on submerged surfaces.	**3-4**

4	**Lectures:** • Conservation of mass. **Labs/Tutorials:** • Solve problems on conservation of mass.	**5**
5	**Lectures:** • Momentum and energy equations. • Bernoulli's equation **Labs/Tutorials:** • Solve problems on energy and Bernoulli equations.	**6-7**
6	**Lectures:** • Dimensional analysis and similarity. **Labs/Tutorials:** • Solve problems on dimensional analysis.	**8**
7	**Midterm**	**9**
9	**Lectures:** • Viscous flow. **Labs/Tutorials:** • Solve problems on viscus flow.	**10**
10	**Lectures:** • Flow past immersed bodies. **Labs/Tutorials:** • Solve problems on flow past immersed bodies.	**11**
11	**Lectures:** • Pipe flow. **Labs/Tutorials:** • Solve problems on pipe flow.	**12**
12	**Lectures:** • Laminar and turbulent flow • Friction losses. **Labs/Tutorials:** • Use Moody chart and solve problems on friction losses.	**13-14**

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
	A1.1	x			x	x	x	x	x							

A-Lev	A1.2	**x**			**x**		**x**	**x**								
D-Level	D1.1	**x**			**x**		**x**	**x**				**x**	**x**			
	D1.2	**x**			**x**	**x**	**x**	**x**	**x**			**x**				
	D3.1	**x**			**x**	**x**	**x**						**x**			

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, D1.1
2	Practical/ Oral Examination	A1.1, A1.2, D1.1, D1.2, D3.1
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	A1.1, A1.2, D1.1, D1.2
4	Final Term Examination (written)	A1.1, A1.2, D1.1, D1.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	**20**
2	Practical/ Oral Examination	**10**
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	**20**
4	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	White, F. M. “Fluid mechanics” 2021.
2	Çengel, Y. A.” Fluid mechanics fundamentals and applications” 2017.
3	B. R. Munson, D.F. Young and T.H. Okiishi “Fundamentals of Fluid Mechanics” 2016.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Lectures:** • Concepts and definitions **Labs/Tutorials:** • Review the basics concepts and units.	**1**	A1.1, A1.2
2	**Lectures:** • Fluid static **Labs/Tutorials:** • Solve problems on fluid statics.	**1**	A1.2, D1.2
3	**Lectures:** • Forces on submerged surfaces and bodies • Non-viscous flow **Labs/Tutorials:** Solve problems on submerged surfaces.	**1**	A1.1, A1.2, D1.1, D1.2
4	**Lectures:** • Conservation of mass. **Labs/Tutorials:** • Solve problems on conservation of mass.	**1**	A1.1, A1.2, D1.1
5	**Lectures:** • Momentum and energy equations. • Bernoulli’s equation **Labs/Tutorials:** • Solve problems on energy and Bernoulli equations.	**1**	A1.1, A1.2, D1.1, D1.2
6	**Lectures:** • Dimensional analysis and similarity. **Labs/Tutorials:** • Solve problems on dimensional analysis.	**1**	A1.2, A3.2, D1.1
7	**Midterm**	**1**	A1.1, A1.2, D1.1, D1.2

9	**Lectures:** • Viscous flow. **Labs/Tutorials:** • Solve problems on viscus flow.	**1**	A1.1, A1.2, D1.2
10	**Lectures:** • Flow past immersed bodies. **Labs/Tutorials:** • Solve problems on flow past immersed bodies**.**	**1**	A1.1, A1.2, D1.1, D1.2
11	**Lectures:** • Pipe flow. **Labs/Tutorials:** • Solve problems on pipe flow.	**1**	A1.1, A1.2, D1.1, D1.2, D3.1
12	**Lectures:** • Laminar and turbulent flow • Friction losses. **Labs/Tutorials:** Use Moody chart and solve problems on friction losses.	**1**	A1.2, D1.1, D3.1

Course: "Introduction to construction management-BCM 123"	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	**A1.1** Define the concepts of physical meaning and phenomena are used in fluid mechanics. **A1.2** Analyze the theories of mathematics and sciences are used for fluid mechanics.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Surveying, Measurements, and Mechanical and Electrical Design.	**D1.1** Analyze the engineering problems are used in fluid mechanics. **D1.2** Study the general laws of flow related to the fluid from different sources.
D3. Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	**D3.1** Write the reports in accordance with the standard scientific guidelines.
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	**A1.1** Define the concepts of physical meaning and phenomena are used in fluid mechanics. **A1.2** Analyze the theories of mathematics and sciences are used for fluid mechanics.

D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Surveying, Measurements, and Mechanical and Electrical Design.	**D1.1** Analyze the engineering problems are used in fluid mechanics. **D1.2** Study the general laws of flow related to the fluid from different sources.

Course Coordinator: Prof. Dr/ Abdelhady Elabady

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Chemical Engineering		
Course Code	HUM 192 / **Human Rights**		
Year / Level / Semester	First Level (Sophomore)		
Prerequisite	None		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

2 Course aims:

No.	aim
1	Identify the basic knowledge and skills of political significance of human rights, the idea of "universal" human rights, its global politics for condemning these and other crimes against humanity.

3 Learning Outcomes (LOs):

A8-1	Communicate effectively with colleges to prepare and present HUMAN RIGHTS case studies as a technical report and presentation.
A8-2	Work independently and within a team for class project and assignments.
A9-1	Use Moral Elements in The HUMAN RIGHTS to Lead and motivate individuals.
A9-2	Use FOUNDATIONS OF RIGHTS to anticipate and respond to new situations related to Human Rights
A10-1	Organize and manage time and resources effectively; for short-term and longer-term commitments.
A10-2	Demonstrate an understanding of the effect of Symptoms Scientific Thought in Society.
A10-3	Identify the difference between INTERNATIONAL CRIMINAL LAW, and HUMAN RIGHTS COURTS

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • What are human rights? (or the problem of definitions).	**1-2**
2	**Lectures:** • Foundations of rights: enlightenment history and theory.	**3**
3	**Lectures:** • The United Nations: structure and function.	**4**
4	**Lectures:** • GENOCIDE, INTERNATIONAL CRIMINAL LAW, and HUMAN RIGHTS COURTS.	**5**
5	**Lectures:** • The interrelatedness of rights.	**6**

6	**Lectures:** - Types of rights 1: civil and political rights.	**7-8**
7	**Midterm**	**9**
9	**Lectures:** - TYPES OF RIGHATS: ECONOMIC, SOCIAL, and CULTURAL RIGHTS.	**10**
10	**Lectures:** - Human rights in Egypt.	**11**
11	**Lectures:** - SOCIAL MOVEMENTS, SOCIAL MEDIA, and REPRESENTATIONS OF RIGHTS.	**12**
12	**Lectures:** Human rights narratives.	**13**
13	**Lectures:** “Special rights”: women’s rights.	**14**

5 Teaching and Learning Methods:

LO’s		**Teaching and Learning Method**														
		Lecture (online-In class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A8-1	X		X	X	X			X	X			X			
	A8-2	X			X				X	X		X				
	A9-1	X				X			X							
	A9-2	X		X		X			X							
	A10-1	X			X					X			X			
	A10-2	X				X			X							
	A10-3	X				X			X							

6 Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online/offline lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A8-1, A8-2, A9-1, A9-2, A10-2, A10-3
2	Formative (quizzes- online quizzes- presentation - reports)	A8-1, A8-2, A9-1, A9-2, A10-1, A10-2, A10-3
3	Final Term Examination (written)	A8-1, A8-2, A9-1, A9-2, A10-1, A10-2, A10-3

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	Week 9
2	Formative (quizzes- online quizzes- presentation - reports)	Throughout the semester
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes- presentation - reports)	30
3	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	Daniel Moeckli, Sangeeta Shah, Sandesh Sivakumaran, David Harris, International Human Rights Law 1st Edition, Oxford University Press; 2010.
2	Surya P. Subedi, OBE, QC, The Effectiveness of the UN Human Rights System: Reform and the Judicialisation of Human Rights, ISBN 9780367224240, 2019
3	Reis Monteiro, A., Ethics of Human Rights, ISBN 978-3-319-03566-6, 2014

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System Facility
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures:** • What are human rights? (or the problem of definitions).	1	A8-1, A8-2, A9-1
2	**Lectures:** • Foundations of rights: enlightenment history and theory.	1	A8-1, A8-2, A9-1, A9-2
3	**Lectures:** The united nations: structure and function.	1	A8-1, A8-2, A9-1, A9-2
4	**Lectures:** • GENOCIDE, INTERNATIONAL CRIMINAL LAW, and HUMAN RIGHTS COURTS.	1	A8-1, A8-2, A10-3
5	**Lectures:** • The interrelatedness of rights.	1	A8-1, A8-2, A10-2
6	**Lectures:** • Types of rights 1: civil and political rights.	1	A8-1, A8-2, A10-2
7	**Midterm**	1	A8-1, A8-2, A10-2
9	**Lectures:** • TYPES OF RIGHATS: ECONOMIC, SOCIAL, and CULTURAL RIGHTS.	1	A8-1, A8-2, A9-1, A9-2, A10-2, A10-3
10	**Lectures:** • Human rights in Egypt.	1	A9-1, A9-2, A10-2
11	**Lectures:** • SOCIAL MOVEMENTS, SOCIAL MEDIA, and REPRESENTATIONS OF RIGHTS.	1	A9-1, A10-2
12	**Lectures:** Human rights narratives.	1	A9-1, A10-2
13	**Lectures:** "Special rights": women's rights.	1	A9-1, A10-2

HUM192: Human Rights	
Program LOs	**Course LOs**
A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Communicate effectively with colleges to prepare and present HUMAN RIGHTS case studies as a technical report and presentation.
	A8-2 Work independently and within a team for class project and assignments.
A9- Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9-1 Use Moral Elements in The HUMAN RIGHTS to Lead and motivate individuals.
	A9-2 Use FOUNDATIONS OF RIGHTS to anticipate and respond to new situations related to Human Rights
A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Organize and manage time and resources effectively; for short-term and longer-term commitments.
	A10-2 Demonstrate an understanding of the effect of Symptoms Scientific Thought in Society.
	A10-3 Identify the difference between INTERNATIONAL CRIMINAL LAW, and HUMAN RIGHTS COURTS

Course Coordinator: Dr. /Mona Hamoda

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	NGEP		
Course Code	**NGP211 Petroleum Geology**		
Year/ Level	2nd Level (junior)		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	-	3

2. Course aims:

No.	Aim
1	Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify Rock types.
7	Apply analytical, experimental, geological processes with proficiency aided by modern engineering tools.

3. Learning Outcomes (LO's):

A1.1.	Identify Rock types and rock cycle. Sedimentary rock classifications, sedimentary rock environment and its content.
A2.1.	Evaluate the design results according to the condition of slope and materials forming it and degree of slope.
A4.1.	Analyze the Migration process, types and factor effects on it, Cap rock and trapping process, types of traps, stratigraphic traps, structure, and salt dome traps
A5.1.	Practice Searching for rock sources, petroleum generation process and environment.
D13.1.	Demonstrate Geophysics, potential geophysical methods in hydrocarbon exploration, Seismic survey, seismic interpretation, seismic rule in petroleum exploration.

4. Course Contents:

No.	Topics	Week
1	Historical background and the petroleum generation theory.	1
2	Rock types and rock cycle. Sedimentary rock classifications, sedimentary rock environment and its content.	2
3	Petrophysics of sedimentary rocks.	3
4	Sedimentary rock structure, Source rock, petroleum generation process and environment	4-5
5	Reservoir rock environment, types, and parameters.	6
6	Factors effect on reservoirs, reservoir quality.	7

7	Migration process, types, and factor effects on it.	8
8	Midterm written examination	9
9	Cap rock and trapping process, types of traps.	10
10	stratigraphic traps, structure and salt dome traps, Choice the best location for accumulation and drilling.	11-12
11	Geophysics, potential geophysical methods in hydrocarbon exploration, Seismic survey.	13
12	seismic interpretation, seismic rule in petroleum exploration, Choice the best location for accumulation and drilling.	14
13	Presentations; hydrocarbon source rock parameters and unconventional reservoirs. Summary and review	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	**X**		**X**		**X**				**X**					**X**
	A2.1	**X**	**X**		**X**	**X**									**X**
	A4.1	**X**		**X**		**X**	**X**								
	A5.1	**X**	**X**	**X**		**X**	**X**								**X**
D-Level	**D13.1**	**X**	**X**			**X**									

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A1.1,A2.1,A5.1,D13.1
2	Practical Examination	A1.1,A2.1,A4.1
3	Oral Examination	A1.1,D13.1
4	Formative (quizzes- online quizzes- presentation)	A1.1,A2.1,A4.1,A5.1,D13.1
5	Final Term Examination (written)	A1.1,A2.1,A4.1,A5.1,D13.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	10
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	25
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Elements of Petroleum Geology,3rd Edition, By Richard C. Selley Stephen A. Sonnenberg 2014
2	Bjorlykke, K. (2010). Petroleum Geoscience: From Sedimentary Environments to Rock Physics (1st Edition. 2nd Printing. 2010 ed.). Springer.
3	Greensmith, J. (2012). Petrology of the Sedimentary Rocks. Springer Publishing.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Historical background and the petroleum generation theory.	1	A1.1,2.1
2	Rock types and rock cycle. Sedimentary rock classifications, sedimentary rock environment and its content.	7	A2.1,A4.1,A5.1
3	Petrophysics of sedimentary rocks.	1	A4.1,A5.1,D13.1
4	Sedimentary rock structure, Source rock, petroleum generation process and environment	1	A1.1,A5.1
5	Reservoir rock environment, types and parameters.	7	A2.1,D13.1
6	Factors effect on reservoirs, reservoir quality.	1	A2.1,A4.1,A5.1
7	Migration process, types and factor effects on it.	7	A5.1,A13.1
8	Midterm written examination	1,7	A1.1,A2.1,A5.1,D13.1
9	Cap rock and trapping process, types of traps.	1,7	A1.1,A2.1,A5.1,D13.1
10	stratigraphic traps, structure and salt dome traps, Choice the best location for accumulation and drilling.	1	A1.1,A4.1,A5.1,B13.1

11	Geophysics, potential geophysical methods in hydrocarbon exploration, Seismic survey.	1,7	A1.1,A2.1,D13.1
12	seismic interpretation, seismic rule in petroleum exploration, Choice the best location for accumulation and drilling.	7	A2.1,A4.1,A5.1,D13.1
13	Presentations; hydrocarbon source rock parameters and unconventional reservoirs. Summary and review	1	A1.1, A2.1,A4.1,A5.1,D13.1

Course: Petroleum Geology	
Program LO's	**Course LO's**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1 Identify Rock types and rock cycle, Sedimentary rock classifications, sedimentary rock environment and its contents.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Evaluate the design results according to the condition of slope and materials forming it and degree of slope.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1 Analyze the Migration process, types and factor effects on it, Cap rock and trapping process, types of traps, stratigraphic traps, structure, and salt dome traps
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Practice Searching for rock sources, petroleum generation process and environment.
D13. Analyze geological data, interpret well-logs, estimate hydrocarbon reserves and evaluate reservoir performance by applying the principles and basic concepts of geology, geophysics and reservoir engineering.	D13.1 Demonstrate Geophysics, potential geophysical methods in hydrocarbon exploration, Seismic survey, seismic interpretation, seismic rule in petroleum exploration.

Course Coordinator: Dr. Prof. Dr. Muhammad Nabih.

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	NGEP		
Course Code	**NGP221 Natural Gas Fluid Properties**		
Year/ Level	2nd Level (Junior)		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	3	2	-

2. Course aims:

No.	Aim
1	Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve engineering problems in Natural Gas Fluid Properties

3. Learning Outcomes (LO's):

A5.1.	Distinguish the suitable hydrocarbon sampling methods from reservoir.
A5.2.	Investigate the data of the fluid behavior at different pressure and temperatures.
D1.1.	Apply the material balance equation to predict the type of reservoir fluid and recovery factor.
D7.1.	Use the obtained reservoir data to determine the hydrocarbon phase.

4. Course Contents:

No.	Topics	Week
1	Introduction	1
2	Introductory phase behavior and fluid flow concepts	2-3
3	Behavior of gas (ideal and real gas behavior)	4-5
4	Properties of natural gas	6-7
5	Midterm exam	8
6	Behavior of liquids	9-10
7	Vapor-liquid equilibrium	11-12
8	Gas condensate systems	13-14
9	Dissolved gas systems	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A5.1	X				X									
	A5.2	X	X	X	X	X	X				X				
D-Level	D1.1	X	X	X		X	X								
	D.7.1	X	X			X					X				

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A5.1,A5.2,D1.1
2	Practical Examination	A5.2,D1.1
3	Oral Examination	A5.1,D7.1

4	Formative (quizzes- online quizzes- presentation)	A5.1,A5.2,D1.1,D7.1
5	Final Term Examination (written)	A5.1,A5.2,D1.1,D7.1

7.2 Assessment Schedule:

No.	**Assessment Method**	**Weeks**
1	Mid Term Examination (written/ online)	**9**
2	Practical/ Oral Examination	**-**
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	**Assessment Method**	**Weights**
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	**Reference List**
1	Cengel, Y., & Cimbala, J. Fluid Mechanics Fundamentals and Applications (3rd ed.). McGraw-Hill Education (2013).

9. Facilities Required for Teaching and Learning:

No.	**Facility**
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction	1	A5.1,A5.2,D1.1
2	Introductory phase behavior and fluid flow concepts	1	A5.1,D1.1,D7.1
3	Behavior of gas (ideal and real gas behavior)	1	A5.2,D7.1
4	Properties of natural gas	1	A5.1.A5.2,D1.1
5	Midterm exam	1	A5.1,A5.2,D1.1
6	Behavior of liquids	1	A5.1,D1.1
7	Vapor-liquid equilibrium	1	A5.2,D1.1,D7.1
8	Gas condensate systems	1	A5.1,D1.1,D7.1
9	Dissolved gas systems	1	A5.1,D1.1,D7.1

Course: Natural Gas Fluid Properties	
Program LO's	**Course LO's**
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1. Distinguish the suitable hydrocarbon sampling methods from reservoir.
	A5.2. Investigate the data of the fluid behavior at different pressure and temperatures.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Measurements, and Mechanical Design.	D1.1.Apply the material balance equation to predict the type of reservoir fluid and recovery factor
D7. Apply numerical modeling methods and/or computational techniques.	D7.1.Use the obtained reservoir data to determine the hydrocarbon phase.

Course Coordinator: Dr. Attia Mohamed Attia

Program Coordinator: Prof .Dr. Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	BSM 211 / Differential Equations		
Year / Level / Semester	Second Year (Junior)		
Specialization	Minor		
Prerequisite	Mathematics II		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	2	--

2 Course aims:

No.	aim
1	Identify the essential knowledge about the basic of calculus: Multiple Integrals, The normal and tangent plane, Surface Integration, Differential equations of the first order (basic definitions, separable, homogeneous, exact equations, linear equations, bernoulli's equations), Partial derivatives applications, Maxima of Multivariate functions, Higher order differential equations: (homogeneous and non-homogeneous), Simultaneous, Curvature and Special curves.

3 Learning Outcomes (LOs):

A1.1	Define the different classification of equations.
A1.2	Categorize the Non homogeneous equations; Method of Undetermined coefficients and Variation of parameters.
A1.3	Distinguish between the different kinds of the differential equations of the first order (or second order).
A1.4	Identify the different between the double Integral and the triple Integral.
A1.5	Solve multiple integrals in any other area.
A1.6	Recognize the different between the Maximum and minimum of function of two Variables.
A1.7	Evaluate triple integral, using cylindrical and spherical coordinates.
A2.1	Practice the classification of differential equations.
A2.2	Recognize the different between the different types of differential equations.
A2.3	Apply the different methods to solve the second order differential equations and determine the particular solutions
A2.4	Acquire the operator method and variation of parameters to find the general solution for the second order differential equations.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** Chapter 1: First Order Differential Equations: • Introduction about Classification of the Differential Equations • Separation of Variables, • Homogeneous Equations • Exact Equations • Integrating Factors • Linear Equations • Bernoulli's Equation **Tutorials:** • Apply the classification of differential equations. • Practice of solving differential equations	1-4
2	**Lectures:** Chapter 2: Higher Order Linear Differential Equation. • Homogeneous equations with constant coefficients. • Non homogeneous equations; Method of Undetermined coefficients – Variation of parameters. **Tutorials:** • Apply the different methods to solve the second order differential equations and determine the particular solutions.	5-7
3	**Midterm**	8
4	**Lectures:** Chapter 3: Multiple Integrals • Double integral • Triple integral • Surface integration **Tutorials:** • Evaluate the double Integral, the triple Integral and the area between two curves. • Solve multiple integrals in any other area.	9-11
5	**Lectures:** Chapter 4: Functions of Several Variables • Partial derivatives • Euler's Theorem for homogeneous Functions • Exact differentials • Taylor series of a function of two variables • Maximum and minimum of a function of two variables **Tutorials:** • Apply the limits, discuss continuity and solve differentiability, of functions of several variables. • Use of text- books to solve some problems and collect some data.	11-14

5 Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(online-in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial(online-in class)	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x													
	A1.2	x	x				x									
	A1.3	x	x	x			x									
	A1.4	x	x				x									
	A1.5	x	x	x			x	x								
	A1.6	x	x	x			x	x								
	A1.7	x	x				x	x								
	A2.1	x	x				x									
	A2.2	x	x				x	x								
	A2.3	x	x	x			x									
	A2.4	x					x	x								
	A2.5	x				x	x	x	x							
	A2.6	x	x	x			x	x								
	A2.7	x	x				x	x	x							

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments
3	Lecture (online / in class)

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3 , A2.1, A2.2, A2.3, A2.4
2	Formative (quizzes- online quizzes)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A1.7, A2.1 , A2.2, A2.3, A2.4, A2.5, A2.6
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A1.7, A2.1 , A2.2, A2.3, A2.4, A2.5, A2.6

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	**20**
2	Formative (quizzes- online quizzes)	**30**
3	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	Sheply L. Ross, John Wiley and Sons, “Differential equations 3rd Edition”, copy right 1984, by john Wiley & Sons, Inc., published simultaneously in Canada 2017.
2	Dennis G. Zill and Michael R. Cullen, “Differential Equations with Boundary Problem”, seven edition, PWS Publishers; published simultaneously in Canada, 2015.
3	William E. Boyce, Richard: "Elementary Differential Equations and Boundary Value Problems", 8th Edition Wiley, Publisher John Wiley & Sons, Inc., 2014.
4	K. A. Stroud and Dexter J. Booth, “Advanced Engineering Mathematics” publisher Palgrave Macmillan, 2011.
5	Erwin Kreyszig, Kreyszig Textbook: “Advanced Engineering Mathematics, 10th Edition- slader, 2012.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** Chapter 1: First Order Differential Equations: • Introduction about Classification of the Differential Equations • Separation of Variables, • Homogeneous Equations • Exact Equations • Integrating Factors • Linear Equations • Bernoulli's Equation **Tutorials:** • Apply the classification of differential equations. • Practice of solving differential equations	1	A1.1, A1.3, A2.1,A2.2
2	**Lectures:** Chapter 2: Higher Order Linear Differential Equation. • Homogeneous equations with constant coefficients. • Non homogeneous equations; Method of Undetermined coefficients – Variation of parameters. **Tutorials:** • Apply the different methods to solve the second order differential equations and determine the particular solutions.	1	A1.1 , A1.2 , A1.3 , A2.3, A2.4
3	**Midterm**		A1.1 , A1.2 , A1.3 , A2.3, A2.4
4	**Lectures:** Chapter 3: Multiple Integrals • Double integral • Triple integral • Surface integration **Tutorials:** • Evaluate the double Integral, the triple Integral and the area between two curves.	1	A1.4, A1.5, A1.7, A2.5, A2.6

	• Solve multiple integrals in any other area.		
5	**Lectures:** Chapter 4: Functions of Several Variables • Partial derivatives • Euler's Theorem for homogeneous Functions • Exact differentials • Taylor series of a function of two variables • Maximum and minimum of a function of two variables **Tutorials:** • Apply the limits, discuss continuity, and solve differentiability, of functions of several variable. • Use of text- books to solve some problems and collect some data.	1	A1.3, A1.6 , A2.6

Course: “Differential Equations - BSM 211”	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Define the different classification of equations. A1.2 Categorize the Non homogeneous equations; Method of Undetermined coefficients and Variation of parameters. A1.3 Distinguish between the different kinds of the differential equations of the first order (or second order). A1.4 Identify the different between the double Integral and the triple Integral. A1.5 Solve multiple integrals in any other area. A1.6 Recognize the different between the Maximum and minimum of function of two Variables. A1.7 Evaluate triple integral, using cylindrical and spherical coordinates.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and Interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Practice the classification of differential equations. A2.2 Recognize the different between the different types of differential equations. A2.3 Apply the different methods to solve the second order differential equations and determine the particular solutions. A2.4 Acquire the operator method and variation of parameters to find the general solution for the second order differential equations.

	A2.5 Evaluate double integrals, changing the order of integration, using polar coordinates. A2.6 Apply the limits, discuss continuity, and studying differentiability, of functions of several variable. A2.7 Work in group to solve a particular problems.
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Define the different classification of equations. A1.2 Categorize the Non homogeneous equations; Method of Undetermined coefficients and Variation of parameters. A1.3 Distinguish between the different kinds of the differential equations of the first order (or second order). A1.4 Identify the different between the double Integral and the triple Integral. A1.5 Solve multiple integrals in any other area. A1.6 Recognize the different between the Maximum and minimum of function of two Variables. A1.7 Evaluate triple integral, using cylindrical and spherical coordinates.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and Interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Practice the classification of differential equations. A2.2 Recognize the different between the different types of differential equations. A2.3 Apply the different methods to solve the second order differential equations and determine the particular solutions. A2.4 Acquire the operator method and variation of parameters to find the general solution for the second order differential equations. A2.5 Evaluate double integrals, changing the order of integration, using polar coordinates. A2.6 Apply the limits, discuss continuity, and studying differentiability, of functions of several variable. A2.7 Work in group to solve a particular problems.
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Define the different classification of equations. A1.2 Categorize the Non homogeneous equations; Method of Undetermined coefficients and Variation of parameters.

	A1.3 Distinguish between the different kinds of the differential equations of the first order (or second order). A1.4 Identify the different between the double Integral and the triple Integral. A1.5 Solve multiple integrals in any other area. A1.6 Recognize the different between the Maximum and minimum of function of two Variables. A1.7 Evaluate triple integral, using cylindrical and spherical coordinates.

Course Coordinator: Dr. Youssef Aly Mohamed Baghdadi

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1 Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">Natural Gas Engineering</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Chemical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Electrical Engineering Depart.</td></tr>
<tr><td>Course Code</td><td colspan="3">BSM 212 / Computer Applications</td></tr>
<tr><td>Year / Level / Semester</td><td colspan="3">Second Year (Junior)</td></tr>
<tr><td>Specialization</td><td colspan="3">Minor</td></tr>
<tr><td>Prerequisite</td><td colspan="3">Computers, Numerical Analysis, Fluid Mechanics</td></tr>
<tr><td rowspan="2">Teaching Hours / Bylaw 2012</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>-</td><td>3</td></tr>
</table>

2 Course aims:

No.	aim
4	Use techniques, skills, and modern engineering tools necessary to use computer languages such as MATLAB to solve engineering numerical problems mathematical problems.

3 Learning Outcomes (LOs):

A1.1	Understand the computer application fundamentals.
A1.2	Introduction and review of computer languages.
A3.1	Understand of the numerical methods including (Numerical interpolation and extrapolation – Numerical Integration – numerical processing of matrices – numerical solution of set of linear equations – Numerical solution of ordinary differential equation).
A5.1	Introduce programming of the Numerical Analysis applications (Numerical interpolation and extrapolation – Numerical Integration – numerical processing of matrices – numerical solution of set of linear equations – Numerical solution of ordinary differential equation).
D4.1	Produce computer applications for engineering tools (unit conversion – steam properties - simple calculations).
D4.2	Apply numerical integrations in solving Computer applications for engineering problems
D4.3	Using Matlab for the solution of numerical analysis applications, computer applications for fluid properties

4 Course Contents:

No.	Topics	Week
1	**Lectures:** Flowcharts • Flowcharts • Algorithms • Pseudocode **Labs/Tutorials:** • Review examples of the previously mentioned objects.	1

2	**Lectures:** Basic Control Structures • Sequence • Decision • Looping • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	2

3	**Lectures:** Matrices
	• Properties of Matrices -Initializing Matrices
	• Colon Notation
	• Matrix Operations
	    • Flow Control
	    • Illustrative examples
	Labs/Tutorials:
	• Review examples of the previously mentioned objects.
		3

4	**Lectures:** • Representing Linear Algebra • Jacobi method. • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	4
5	**Lectures:** • Representing Linear Algebra • Gauss-Seidel Iteration • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	5
6	**Lectures:** • Numerical Interpolation • Lagrange Interpolating polynomial • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	6
7	**Lectures:** • Numerical Interpolation • Newton Interpolating polynomial • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	7
8	**Lectures:** • Numerical Interpolation • Newton Divided Difference • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	8
9	Midterm	9

10	**Lectures:** • Roots of Equations • The Bisection Method • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	10
11	**Lectures:** • Roots of Equations • The Newton-Raphson Method • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	11
12	**Lectures:** • Numerical Integration • Trapezoidal Rule's • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	12
13	**Lectures:** • Numerical **Integration** • **-**1/3 Simpson's method • 3/8 Simpson's method • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	13-14
14	**Lectures:** • Computer applications for engineering tools	15

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A1.1	**x**	**x**	**x**	**x**		**x**	**x**							**x**	
	A1.2	**x**	**x**		**x**	**x**			**x**	**x**				**x**	**x**	
	A3.1	**x**	**x**		**x**	**x**	**x**	**x**		**x**					**x**	
	A5.1	**x**	**x**		**x**		**x**			**x**		**x**			**x**	
D-	D4.1	**x**	**x**		**x**	**x**			**x**		**x**				**x**	

	D4.2	x	x		x					x				x	x	
	D4.3	x	x		x					x				x	x	

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A3.1, A5.1, D4.2
2	Practical/ Oral Examination	A3.1, A5.2, D4.1, D4.2
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	A1.1, A1.2, A3.1, A5.1, D4.1, D4.2
4	Final Term Examination (written)	A1.1, A1.2, A3.1, A5.1, D4.1, D4.2, D4.3

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	**20**
2	Practical/ Oral Examination	**10**
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	**20**
4	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	Jaan Kiusalaas,” Numerical Methods in Engineering with MATLAB . 2005
2	Steven T. Karris,” Numerical Analysis Using MATLAB and Excel . 2010

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Lectures:** Flowcharts • Flowcharts • Algorithms • Pseudocode **Labs/Tutorials:** • Review examples of the previously mentioned objects.	**4**	A1.1, A1.2
2	**Lectures:** Basic Control Structures • Sequence • Decision • Looping • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	**4**	A1.1, A1.2

3	**Lectures:** Matrices
	• Properties of Matrices -Initializing Matrices
	• Colon Notation
	• Matrix Operations
	  • Flow Control
	  • Illustrative examples
	Labs/Tutorials:
	• Review examples of the previously mentioned objects.
		4	A3.1, A5.1, D4.3

4	**Lectures:** • Representing Linear Algebra • Jacobi method. • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	**4**	A3.1, A5.1, D4.3

5	**Lectures:** • Representing Linear Algebra • Gauss-Seidel Iteration • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	**4**	A3.1, A5.1, D4.3
6	**Lectures:** • Numerical Interpolation • Lagrange Interpolating polynomial • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	**4**	A3.1, A5.1, D4.3
7	Midterm	**4**	A1.2, A3.1, A5.1, D4.3
8	**Lectures:** • Numerical Interpolation • Newton Interpolating polynomial • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	**4**	A3.1, A5.1, D4.3
9	**Lectures:** • Numerical Interpolation • Newton Divided Difference • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	**4**	A3.1, A5.1, D4.3
10	**Lectures:** • Roots of Equations • The Bisection Method • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	**4**	A3.1, A5.1, D4.3
11	**Lectures:** • Roots of Equations • The Newton-Raphson Method • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	**4**	A3.1, A5.1, D4.3
12	**Lectures:** • Numerical Integration • Trapezoidal Rule's • Illustrative examples **Labs/Tutorials:** • Review examples of the previously mentioned objects.	**4**	A3.1, A5.1, D4.3

13	**Lectures:** - Numerical **Integration** - 3/1-Simpson's method - 8/3-Simpson's method - Illustrative examples **Labs/Tutorials:** - Review examples of the previously mentioned objects.	**4**	A3.1, A5.1, D4.2, D4.3
14	Computer applications for engineering tools	**4**	A3.1, A5.1, D4.1, D4.3

Course: "Introduction to construction management-BCM 123"	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Understand the computer application fundamentals. A1.2 Introduction and review of computer languages.
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.1 Understand of the numerical methods including (Numerical interpolation and extrapolation – Numerical Integration – numerical processing of matrices – numerical solution of set of linear equations – Numerical solution of ordinary differential equation)
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Introduce programming of the Numerical Analysis applications (Numerical interpolation and extrapolation – Numerical Integration – numerical processing of matrices – numerical solution of set of linear equations – Numerical solution of ordinary differential equation).
D4. Demonstrate additional abilities to select appropriate system, analyze, and design using the most	D4.1 Produce computer applications for engineering tools

up-to-date analytical tools, techniques, equipment, and software packages.	(unit conversion – steam properties .(- simple calculations D4.2 Apply numerical integrations in solving Computer applications for engineering problems D4.3 Using Matlab for the solution of numerical analysis applications, computer applications for fluid properties
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Understand the computer application fundamentals A1.2 Introduction and review of computer languages.

Course Coordinator: Dr. Walaa Elsayed Saber

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Mechanical Power Engineering		
Course Code	BSM 213 / Thermodynamics		
Year / Level / Semester	Second Year (Junior)		
specialization	Minor		
Prerequisite	Fluid Mechanics		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	--	3

2 Course aims:

No.	Aim
1	Apply engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve thermodynamics problems in real life.

3 Learning Outcomes (LOs):

A1.1	Define thermodynamics, thermodynamic equilibrium and entropy.
A1.2	Identify the different thermodynamic properties, assumptions of ideal gas, and properties of ideal gas.
A3.1	Explain the behavior of water as pure substance and its phase change.
A3.2	State the different sources of energy, types of energy.
D1.1	Apply the first and second laws of thermodynamics on a process or cycle.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Concepts and definitions **Labs/Tutorials:** • Review the basics concepts and units.	**1**
2	**Lectures:** • Concepts of Heat and work. **Labs/Tutorials:** • Solve problems on the basics of thermodynamics.	**2**
3	**Lectures:** • First law of thermodynamics • Applications of first law on closed system and control volume **Labs/Tutorials:** • Solve problems on the first law of thermodynamics.	**3-4**
4	**Lectures:** • Second law of thermodynamics. **Labs/Tutorials:** • Solve problems on the second law of thermodynamics.	**5**
5	**Lectures:**	**6**

	• Entropy, isentropic efficiency. **Labs/Tutorials:** • Solve problems on isentropic efficiency.	
6	**Lectures:** • Heat engine and heat pump. • Ideal Gas. **Labs/Tutorials:** • Solve problems on heat engine and heat pump.	**7-8**
7	**Midterm**	**9**
9	**Lectures:** • Properties of pure substances, steam properties and tables. **Labs/Tutorials:** • Use steam tables and solve problems on steam properties.	**10**
10	**Lectures:** • Thermodynamic cycles. **Labs/Tutorials:** • Solve problems related to thermodynamic cycles.	**11**
11	**Lectures:** • Simple gas turbine cycle (open and close). **Labs/Tutorials:** • Solve problems on gas turbine cycles.	**12**
12	**Lectures:** • Psychometric air properties. **Labs/Tutorials:** • Use psychometric chart and solve problems on air properties.	**13-14**

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A1.1	x			x	x	x		x							
	A1.2	x			x		x	x								
	A3.1	x			x		x	x								
	A3.2	x			x	x	x	x	x							

D-Level	D1.1	**x**			**x**		**x**	**x**				**x**	**x**			

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A3.1
2	Practical/ Oral Examination	A1.1, A1.2, A3.1, A3.2, D1.1
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	A1.1, A1.2, A3.1, A3.2
4	Final Term Examination (written)	A1.1, A1.2, A3.1, A3.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	**20**
2	Practical/ Oral Examination	**10**
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	**20**
4	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	R. K. Rajput "Engineering Thermodynamics" 2020.
2	Singh, O. "Applied Thermodynamics", 2015.
3	Michael J. Moran and Howard N. Shapiro "Fundamentals of Engineering Thermodynamics" 2020.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures:** • Concepts and definitions **Labs/Tutorials:** • Review the basics concepts and units.	**1**	A1.1, A1.2
2	**Lectures:** • Concepts of Heat and work. **Labs/Tutorials:** • Solve problems on the basics of thermodynamics.	**1**	A1.2, A3.2
3	**Lectures:** • First law of thermodynamics • Applications of first law on closed system and control volume **Labs/Tutorials:** Solve problems on the first law of thermodynamics.	**1**	A1.1, A1.2, A3.2, D1.1
4	**Lectures:** • Second law of thermodynamics. **Labs/Tutorials:** • Solve problems on the second law of thermodynamics.	**1**	A1.1, A1.2, D1.1
5	**Lectures:** • Entropy, isentropic efficiency. **Labs/Tutorials:** • Solve problems on isentropic efficiency.	**1**	A1.1, A1.2, A3.2, D1.1
6	**Lectures:** • Heat engine and heat pump. • Ideal Gas. **Labs/Tutorials:** • Solve problems on heat engine and heat pump	**1**	A1.2, A3.2, D1.1

	.		
7	**Midterm**	**1**	A1.1, A1.2, A3.1
9	**Lectures:** - Properties of pure substances, steam properties and tables. **Labs/Tutorials:** - Use steam tables and solve problems on steam properties.	**1**	A1.1, A3.1
10	**Lectures:** - Thermodynamic cycles. **Labs/Tutorials:** - Solve problems related to thermodynamic cycles**.**	**1**	A1.1, A1.2, A3.2, D1.1
11	**Lectures:** - Simple gas turbine cycle (open and close). **Labs/Tutorials:** - Solve problems on gas turbine cycles.	**1**	A1.1, A1.2, A3.2, D1.1
12	**Lectures:** - Psychometric air properties. **Labs/Tutorials:** Use psychometric chart and solve problems on air properties.	**1**	A1.2, D1.1

Course: "Thermodynamics -BSM 213"	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	**A1.1** Define thermodynamics, thermodynamic equilibrium and entropy. **A1.2** Identify the different thermodynamic properties, assumptions of ideal gas, properties of ideal gas.
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	**A3.1** Explain the behavior of water as pure substance and its phase change. **A3.2** State the different sources of energy, types of energy.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Surveying, Measurements, and Mechanical and Electrical Design.	**D1.1** Apply the first and second laws of thermodynamics on a process or cycle.

Course Coordinator: Prof. Dr/ Abdelhady Elabady

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Chemical Engineering		
Course Code	HUM 291 / Technical English Language III		
Year / Level / Semester	Second Year (Junior)		
Prerequisite	Technical English II		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	1	-	3

2 Course aims:

No.	aim
5	Master self-learning and life-long learning strategies and communicate effectively using different modes, tools, and languages to improve technical English writing skills and provide a technical manuscript and reports following different writing styles. More specifically the course introduces different section of a technical report and how to write each section.

3 Learning Outcomes (LOs):

A8.1	Understand English verbs and their mechanics.
A8.2	Identify how to write numbers, symbols abbreviations and engineering equations.
A9.1	Show a live presentation on a related topic.
A10.1	Search relevant literatures.
D6.1	Communicate effectively in technical English

4 Course Contents:

No.	Topics	Week
1	• Punctuation rules	**1**
2	• Basic grammar rules	**2**
3	• Common Mistakes in English	**3-4**
4	• Rules of technical writing	**5**
5	• Structure of technical report	**6**
6	• Different Types of technical reports	**7-8**
7	**Midterm**	**9**
8	• Report Writing Aids	**10**
9	• Report samples	**11**
10	• How to present your report	**12**
11	• Report Writing Aids	**13-14**

5 Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (Online/offline)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	**A8.1**	x			x	x			x							
	A8.2	x			x			x								
	A9.1	x			x			x								
	A10.1	x			x	x		x	x							
D-Level	**D6.1**	x			x							x	x		x	

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online/offline lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written)	A8.1, A8.2, A9.1, A10.1
2	Formative (quizzes - online quizzes - reports)	A8.1, A8.2, A9.1, A10.1, D6.1
3	Final Term Examination (written)	A8.1, A8.2, A9.1, A10.1, D6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written)	9
2	Formative (quizzes - online quizzes - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written)	**20**
2	Formative (quizzes - online quizzes - reports)	**30**
3	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	Blicq, Ronald (2003). "Technically-Write!". Prentice Hall. ISBN 0-13-114878-8.
2	Gerson, Sharon and Gerson, Steven (2005). *Technical Writing: Process and Product*. Prentice Hall. ISBN 0-13-119664-2.
3	Lannon, John (2007). Technical Communication. Longman. ISBN 0-205-55957-
4	D. J. Weatherford, “Technical Writing in Engineering Professions“, 2016.
5	Phillip A. Laplante, “Technical Writing: A Practical Guide for Engineers and Scientists”, CRC Press, 2nd edition, July 2018.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System Facility
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	• Punctuation rules	**5**	A8.1, A8.2,
2	• Basic grammar rules	**5**	A8.1, A8.2, A9.1,A10.1,D6.1
3	• Common Mistakes in English	**5**	A8.1, A8.2, A9.1,A10.1,D6.1
4	• Rules of technical writing	**5**	A8.1, A8.2, A9.1,A10.1,D6.1
5	• Structure of technical report	**5**	A8.1, A8.2, A9.1,A10.1,D6.1
6	• Different Types of technical reports	**5**	A8.1,A8.2, A9.1,A10.1,D6.1
7	**Midterm**	**5**	A8.1, A8.2, A9.1,A10.1
9	• Report Writing Aids	**5**	A8.1,A8.2, A9.1,A10.1,D6.1

10	- Report samples	**5**	A8.1,A8.2, A9.1,A10.1,D6.1
11	- How to present your report	**5**	A8.1,A8.2, A9.1,A10.1,D6.1
12	- Report Writing Aids	**5**	A8.1,A8.2, A9.1,A10.1,D6.1

Course: “Technical English III-HUM 291”	
Program LOs	**Course Los**
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	**A8.1** 1 Understand English verbs and their mechanics. **A8.2** Identify how to write numbers, symbols abbreviations and engineering equations,
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	**A9.1** Show a live presentation on a related topic
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	**A10.1** Search relevant literatures
D6 Prepare and present technical language and report writing.	**D6.1** Communicate effectively in technical English

Course Coordinator: Dr. Arwa Wafik Hussein

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Chemical Engineering		
Course Code	**NGP 222 Well Drilling & Completion**		
Year/ Level	2nd Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	3	2	-

2. Course aims:

No.	Aim
6	Act professionally in design of components of well drilling operations and completion.
8	Use the modern technologies and material safety data sheets while designing and handling natural gas projects.

3. Learning Outcomes (LO's):

A1.1.	Apply analytical methods to design various components of drilling operations and demonstration of some simple design problems.
D14.1.	Plan and construct oil wells and Solve drilling & Tripping Parameters Problems
D14.2.	Investigate offshore drilling and advanced drilling tools
D20.1.	Design the preparation for drilling, rig selection and installation, the circulating system, the rotary system.

4. Course Contents:

No.	Topics	Week
1	Drilling rig types and its component	1-2
2	Drilling fluids	2-3
3	Drilling fluid measurements	4-6
4	Rotary drilling bits	7-8
5	Midterm Exam	9
6	Casing design	10-11
7	Casing cementing	12
8	Introduction to directional drilling	13-14
9	General revision	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	X		X											
D-Level	**A14.1**	X	X		X	X									
	A14.2	X	X			X									
	D20.1	X		X		X									

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A1.1,A14.1,A14.2
2	Practical Examination	A1.1,D14.2,D20.1
3	Oral Examination	D14.2
4	Formative (quizzes- online quizzes-presentation)	A1.1,A14.1,A14.2,D20.1
5	Final Term Examination (written)	A1.1,A14.1,A14.2,D20.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	*Hossain, M. E. Fundamentals of Drilling Engineering. Wiley (2016).*

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Drilling rig types and its component	6	A1.1
2	Drilling fluids	8	D14.1,D20.1
3	Drilling fluid measurements	8	D14.1,D20.1
4	Rotary drilling bits	6,8	A1.1,D14.1
5	Midterm Exam	6,8	A1.1,A14.1,A14.2
6	Casing design	6	A1.1,D14.1,D20.1

7	Casing cementing	8	A1.1,D14.2,D20.1
8	Introduction to directional drilling	**6**	A1.1,D14.1,D20.1
9	General revision	6,8	A1.1,D14.1,D14.2,D20.1

Course: Well Drilling & Completion	
Program LO's	**Course LO's**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1 Apply analytical methods to design various components of drilling operations and demonstration of some simple design problems.
D14. Plan and construct oil wells, develop oilfield production programs, design early surface facilities plants and field evacuation plans by applying the principles and basic concepts of drilling engineering, production engineering, phase equilibrium, fluid mechanics and flow through porous media.	D14.1 Plan and construct oil wells and Solve drilling & Tripping Parameters Problems.
	D14.2 Investigate offshore drilling and advanced drilling tools.
D20. Create and/or re-design a process, component, or system, and carry out specialized engineering designs related to gas reservoir and well drilling and completion.	D20.1 Design the preparation for drilling, rig selection and installation, the circulating system, the rotary system.

Course Coordinator: Dr. Hossam Mansour

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP 223 Natural Gas Production Engineering**		
Year/ Level	2nd Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
8	Use the modern technologies and material safety data sheets while designing and handling natural gas Production equipment.

3. Learning Outcomes (LO's):

A4.1.	Define the natural drive mechanisms in gas and oil reservoir, Darcy flow model for compressible gas fluid and calculation. Skin damage impact on oil and gas reservoir and how to manage skin and treat it, Ways to maximize the recovery in cost effective manners from oil and gas reservoirs.
A4.2.	Analyze the factors affecting the reservoir flow in porous media, Darcy flow equation dependency and derivation, transient well flow analysis and solution to diffusivity equation.
D1.1.	Identify the different reservoir production and recovery techniques including natural drive mechanisms in oil and gas reservoirs, artificial lift types and techniques, secondary recovery, and tertiary recovery techniques.
D15.1.	Analyze the wellbore hydraulics and flow regimes, different correlation to determine the pressure gradient and different choke models.
D15.2.	Estimate designing and modeling of reservoir inflow performance, vertical lift performance and bean performance. using prosper software.

4. Course Contents:

No.	Topics	Week
1	Roles of production engineering in oil and gas fields management	1
2	Production recovery methods: primary, secondary, and tertiary methods	2-3
3	Introduction to artificial lift need and methods	4-5
4	Darcy Fluid flow behavior for compressible and incompressible fluid in linear, radial and spherical flow system	6-7

5	Midterm-Exam	8
6	Nodal analysis concept and inflow performance relationship	9
7	Pressure gradient calculation and multiphase fluid flow correlations in vertical and horizontal pipes	10-11
8	Outflow performance relationship	12
9	Choke models and bean performance relationship	13
10	Skin damage origins and treatment	14
11	General Revision	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A4.1**	**X**		**X**		**X**									
	A4.2	**X**	**X**			**X**	**X**								
D-Level	**D1.1**	**X**	**X**	**X**	**X**	**X**									
	D15.1	**X**		**X**		**X**	**X**								
	D15.2	**X**				**X**	**X**								

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A4.1,A4.2,D1.1
2	Practical Examination	-
3	Oral Examination	A4.1,A4.2,D1.1
4	Formative (quizzes- online quizzes- presentation)	A4.1,A4.2,D1.1,D15.1
5	Final Term Examination (written)	A4.1,A4.2,D1.1,D15.1.D15.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Ezekwe, N. Petroleum Reservoir Engineering Practice (Paperback) (1st ed.). Prentice Hall (2010).
2	Anon.,“Production Technology II”, Department of Petroleum Engineering, Heriot-Watt University, UK, 2011
3	Wang, X. and Economides, M.: " Advanced Natural Gas Engineering", Gulf Publishing Company Houston, Texas, 2009
4	Guo, B., & Ghalambor, A. Natural Gas Engineering Handbook. Elsevier Gezondheidszorg. (2012).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Roles of production engineering in oil and gas fields management	8	A4.1,D1.1
2	Production recovery methods: primary, secondary and tertiary methods	8	A4.1,D1.1,D15.1
3	Introduction to artificial lift need and methods	8	A4.1,D15.2
4	Darcy Fluid flow behavior for compressible and incompressible fluid in linear, radial and spherical flow system	8	A4.1,A4.2,D15.1
5	Midterm-Exam	8	A4.1,A4.2,D1.1
6	Nodal analysis concept and inflow performance relationship	8	A4.1,D15.1
7	Pressure gradient calculation and multiphase fluid flow correlations in vertical and horizontal pipes	8	A4.1,D1.1,D15.1
8	Outflow performance relationship	8	A4.1,A4.2,D1.1
9	Choke models and bean performance relationship	8	A4.1,D1.1,D15.1,D15.2
10	Skin damage origins and treatment	8	A4.1,D1.1
11	General Revision	8	A4.1,A4.2,D1.1,D15.1.D15.2

Course: Natural Gas Production Engineering I	
Program LO’s	**Course LO’s**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1. Define the natural drive mechanisms in gas and oil reservoir, Darcy flow model for compressible gas fluid and calculation, Skin damage impact on oil and gas reservoir and how to manage skin and treat it, Ways to maximize the recovery in cost effective manners from oil and gas reservoirs.
	A4.2. Analyze the factors affecting the reservoir flow in porous media, Darcy flow equation dependency and derivation, transient well flow analysis and solution to diffusivity equation.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Measurements, and Mechanical Design.	D1.1. Identify the different reservoir production and recovery techniques including natural drive mechanisms in oil and gas reservoirs, artificial lift types and techniques, secondary recovery, and tertiary recovery techniques.
D15. Use specialist computer applications and mathematical models to maximize the performance of all-Natural gas engineering stages.	D15.1. Analyze the wellbore hydraulics and flow regimes, different correlation to determine the pressure gradient and different choke models.
	D15.2. Estimate designing and modeling of reservoir inflow performance, vertical lift performance and bean performance. using prosper software.

Course Coordinator: Dr. Hossam Mansour

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	BSM 221 / Electrical Engineering and Electronics		
Year / Level / Semester	Second Year (Junior)		
Prerequisite	None		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	3

2 Course aims:

No.	aim
1	Apply engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve electrical circuits' components and analysis.
4	Use techniques, skills, and modern engineering tools necessary for electrical engineering and electronics.

3 Learning Outcomes (LOs):

A1.1	Describe the concepts and theories of the Network reduction, Kirchhoff's laws, Nodal and Loop analysis. The different laws of electromagnetism, and electromechanical energy conversion principles.
A2.1	Apply the concepts and theories of magnetic field to understand the construction and conversion process for rotating machines.
A4.1	Recognize the operation and performance of synchronous machines.
A4.2	Give the concepts and theories of mathematics and sciences, appropriate to the DC an Induction Machines.
D4.1	Demonstrate efficient capabilities in dealing with engineering calculations.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Definitions (work, energy, current, voltages,) • Definitions of electrical circuit elements (resistance, capacitance, inductance,) • Drawing of different waveforms of current, voltage, charge,) **Labs/Tutorials:** • Recognition of different electric circuit components • Verification of series and paralle connectios	**1**
2	**Lectures:** • Fundamental of Electrical Circuits (resistive network) • Ohm's laws, Kirchhoff's current and voltage laws **Labs/Tutorials:** • Illustrative examples	**2**

3	**Lectures:** • Nodal and loop analysis **Labs/Tutorials:** • Verification of Kirchhoff's current and voltage laws	**3**
4	**Lectures:** • Review of Basic laws of Electro-magnetism: Maxwell's Equations / magnetic field / magnetic circuits / magnetic behavior of ferromagnetic materials • Principles of Electromechanical Energy Conversion: Faraday's law / induced voltage from a time-changing magnetic field / production of induced force on a wire / induced voltage on a conductor moving in a magnetic field **Labs/Tutorials:** • Exercises.	**4**
5	**Lectures:** • Types and Construction of Transformers. • Ideal Single-Phase Transformer. • Theory of Operation of Practical Single-Phase Transformers • Illustrative Examples **Labs/Tutorials:** • Quiz	**5**
6	**Lectures:** • Transformer Voltage Regulation and Efficiency: The transformer phasor diagram / Transformer efficiency **Labs/Tutorials:** • Illustrative examples.	**6**
7	**Lectures:** • The Equivalent Circuit of DC Motors • The Terminal Characteristic of a shunt DC Motor / Speed Control of Shunt DC Motors. The effect of an Open Field Circuit **Labs/Tutorials:** • Illustrative examples.	**7-8**
8	**Midterm**	**9**
9	**Lectures:** • **The Series DC Motors:** The Induced Torque in a Series DC Motor / The Terminal Characteristic of a Series DC Motor / Speed Control of Series DC Motors. • The Compound DC Motors: The Torque –Speed Characteristic of a Cumulatively Compounded DC Motor / The Torque –Speed Characteristic of a Differentially Compounded DC Motor / Speed Control of a Cumulatively Compounded DC Motor. • DC Motor Efficiency Calculations. **Labs/Tutorials:** • Illustrative examples.	**10-12**
10	**Lectures:** • Single -phase induction: Construction of single-phase induction motors, Operation of induction motors, Motor Equivalent circuits. Single-phase induction motor torque, power and efficiency **Labs/Tutorials:**	**13**

	- Illustrative examples.	
11	**Lectures:** - Power electronics switching devices: Construction and Characteristics: Power diodes, thyristors, GTOs, Triac, and power transistors (BJTs, MOSFETs, and IGBTs), **Labs/Tutorials:** - Illustrative examples.	**14**

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	**x**			**x**		**x**	**x**								
	A2-1	**x**					**x**	**x**								
	A4-1	**x**			**x**		**x**	**x**								
D-Level	**D4-1**	**x**			**x**		**x**	**x**				**x**			**x**	

6 Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online / offline lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A1-1, A2-1, A4-1, D4-1,
2	Practical/ Oral Examination	
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	A2-1, A4-1,

4	Final Term Examination (written)	A1-1, A2-1, A4-1 ,D4-1,

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	**20**
2	Practical/ Oral Examination	**10**
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	**20**
4	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	Nilsson & Riedel "Electric Circuits" 10th Edition, 2014.
2	Fitzgerald, A.E.; Kingsley, C. and Umans, S.D.: “Electric Machinery” 9 th edition, McGraw Hill Co., 2016.
3	Energy Conversion by Yogi Goswami, 2012.
4	Barry W. Williams, "principles and Elements of Power Electronics, Devices, Drivers, Application and Passive components", ELBS edition, 2016.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Lectures:**	**1, 4**	A1-1

	• Definitions (work, energy, current, voltages,) • Definitions of electrical circuit elements (resistance, capacitance, inductance,) • Drawing of different waveforms of current, voltage, charge,) **Labs/Tutorials:** • Recognition of different electric circuit components • Verification of series and paralle connectios		
2	**Lectures:** • Fundamental of Electrical Circuits (resistive network) • Ohm's laws, Kirchhoff's current and voltage laws **Labs/Tutorials:** • Illustrative examples	**1, 4**	A2-1, A4-1,
3	**Lectures:** • Nodal and loop analysis **Labs/Tutorials:** • Verification of Kirchhoff's current and voltage laws	**1, 4**	A2-1, A4-1, A1-1,
4	**Lectures:** • Review of Basic laws of Electro-magnetism: Maxwell's Equations / magnetic field / magnetic circuits / magnetic behavior of ferromagnetic materials • Principles of Electromechanical Energy Conversion: Faraday's law / induced voltage from a time-changing magnetic field / production of induced force on a wire / induced voltage on a conductor moving in a magnetic field **Labs/Tutorials:** • Exercises.	**1, 4**	A2-1, A1-1, D4-1.
5	**Lectures:** • Types and Construction of Transformers. • Ideal Single-Phase Transformer. • Theory of Operation of Practical Single-Phase Transformers • Illustrative Examples **Labs/Tutorials:** • Quiz	**1, 4**	A2-1, A1-1, A4-1.
6	**Lectures:** • Transformer Voltage Regulation and Efficiency: The transformer phasor diagram / Transformer efficiency **Labs/Tutorials:** • Illustrative examples.	**1, 4**	A2-1, A1-1, D4-1
7	**Lectures:** • The Equivalent Circuit of DC Motors • The Terminal Characteristic of a shunt DC Motor / Speed Control of Shunt DC Motors. The effect of an Open Field Circuit	**1, 4**	A1-1, A2-1, A4-1, D4-1.

	Labs/Tutorials: Illustrative examples.		
8	- **Midterm**	**1, 4**	A1-1, A2-1, A4-1, D4-1,
9	**Lectures:** - **The Series DC Motors:** The Induced Torque in a Series DC Motor / The Terminal Characteristic of a Series DC Motor / Speed Control of Series DC Motors. - The Compound DC Motors: The Torque –Speed Characteristic of a Cumulatively Compounded DC Motor / The Torque –Speed Characteristic of a Differentially Compounded DC Motor / Speed Control of a Cumulatively Compounded DC Motor. - DC Motor Efficiency Calculations. **Labs/Tutorials:** - Illustrative examples.	**1, 4**	A1-1, A2-1, A4-1, D4-1,
10	**Lectures:** - Single -phase induction: Construction of single-phase induction motors, Operation of induction motors, Motor Equivalent circuits. Single-phase induction motor torque, power and efficiency **Labs/Tutorials:** - Illustrative examples.	**1, 4**	A2-1, A1-1, , A4-1

Course: “Electrical Engineering and Electronics -BSM 221”	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Describe the concepts and theories of the Network reduction, Kirchhoff’s laws, Nodal and Loop analysis. The different laws of electromagnetism, and electromechanical energy conversion principles.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Apply the concepts and theories of magnetic field to understand the construction and conversion process for rotating machines.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Recognize the operation and performance of synchronous machines. A4.2 Give the concepts and theories of mathematics and sciences, appropriate to the DC an Induction Machines.

D4. Demonstrate additional abilities to select appropriate system, analyze, and design using the most up-to-date analytical tools, techniques, equipment, and software packages.	D4.1 Demonstrate efficient capabilities in dealing with engineering calculations.

Course Coordinator: Assoc. Prof. Ramadan Aly Ahmed

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Civil Engineering		
Course Code	BSM 222/ Plane Surveying & Topography		
Year / Level / Semester	Second Year (Junior)		
Prerequisite	None		
Specialization	Major		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	3

2 Course aims:

No.	aim
1	Apply engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify the basic needs for surveying and topographic mapping.
7	Apply analytical, and experimental processes laboratory and field equipment, using various surveying measuring equipment to gain experience in field work.

3 Learning Outcomes (LOs):

A1.1	Define the basic needs for surveying in civil engineering projects.
A1.2	Describe the fundamentals of surveying and topographic mapping.
A1.3	Define and use the different types of levelling and different angle distance instruments.
A1.4	Carry out mathematical computations for levelling, profile, cross section and contour mapping applications.
A1.5	Carry out closed and connected traverse computations.
A2.1	Predict the accuracy of a set of measurements.
A2.2	Assess and comment on surveying data and results.
D1.1	Create a Plan for conducting survey works for different civil engineering projects.
D2.1	Carry out field work in team group.
D3.1	Select laboratory and field equipment, using various surveying measuring equipment to gain experience in field work.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Basic definitions of plane survey • Types of survey • Units of measure **Labs/Tutorials:**	1

	• Define the different types of levelling and different angle distance instruments in lab.	
2	**Lectures:** • Linear Measurements • Classification of maps and scales **Labs/Tutorials:** • Discuss problems of measurements, distance errors and adjustment	2
3	**Lectures:** • Introduction to leveling. • Types of levels, Leveling field procedure **Labs/Tutorials:** • Discuss and solve problems of leveling by different methods. • Lab application using leveling instruments	3
4	**Lectures:** • Leveling calculations and adjustment • Profiles and contouring **Labs/Tutorials:** • Discuss problems of mathematical computations for contour mapping. • Apply a contour map of a part of faculty in lab. • Using computer program solving contour map problems (Surfer)	4-5
5	**Lectures:** • Area and Volumes • Computations of areas and volumes of earth work in construction sites networks **Labs/Tutorials:** • Quiz: calculations of leveling problems • Discuss problems of earth work volumes	6-7
6	• Midterm	8
7	**Lectures:** • Horizontal control networks for construction sites **Labs/Tutorials:** Discuss problems of earth work volumes	9
8	**Lectures:** • Lengths and angles • Azimuths and bearings **Labs/Tutorials:** • Discuss problems of traverse	10-11
9	**Lectures:** • Theodolite, Total stations field work and applications • Traverse field procedure • Computations and adjustment of closed and connected traverse **Labs/Tutorials:** • Discuss and solve problems of traverse.	12-14

	- Lab application using angle distance instruments (Theodolite)	
10	- Final laboratory examination	15

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x	x	x	x	x	x								
	A1.2	x	x		x	x	x	x								
	A1.3	x	x		x	x		x								x
	A1.4	x	x		x	x	x	x								
	A1.5	x	x		x	x		x				x				x
	A2.1	x	x		x	x	x	x				x				x
	A2.2	x	x		x	x		x								
D-Level	**D1.1**	x	x		x	x	x	x								x
	D2.1	x	x		x	x	x	x				x				x
	D3.1	x	x		x	x	x	x				x				x

6 Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online/offline lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.4
2	Practical/ Oral Examination	A1.3, A2.1, A2.2, D1.1, D2.1, D3.1
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	A1.1, A1.2, A1.4, A1.5
4	Final Term Examination (written)	A1.1, A1.2, A1.4, A1.5, A2.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	**20**
2	Practical/ Oral Examination	**10**
3	Formative (quizzes- online quizzes presentation-Tutorial and report assessment)	**20**
4	Final Term Examination (written)	**50**
Total		100%

8 List of References

No.	Reference List
1	The course notes were prepared by surveying professors in the civil engineering department in the faculty.
2	Jack C. Mc Cormac, H, Surveying Fundamentals, Prentice Hall, Englewood, New Jersy 7th edition 2017
3	Wolf, P.R. and Brinker, R.C., Elementary Surveying, 10th ed., Harper Collins College Publisher, NY, USA (2002)

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures:** • Basic definitions of plane survey • Types of survey • Units of measure **Labs/Tutorials:** • Define the different types of levelling and different	**1, 7**	**A1.1, A1.2**

	angle distance instruments in lab.		
2	**Lectures:** • Linear Measurements • Classification of maps and scales **Labs/Tutorials:** • Discuss problems of measurements, distance errors and adjustment	**1, 7**	**A1.1, A1.2**
3	**Lectures:** • Introduction to leveling • Types of levels, Leveling field procedure **Labs/Tutorials:** • Discuss and solve problems of leveling by different methods Lab application using leveling instruments	**1, 7**	**A1.3, A1.4, A2.1, D1.1, D2.1**
4	**Lectures:** • Leveling calculations and adjustment • Profiles and contouring **Labs/Tutorials:** • Discuss problems of mathematical computations for contour mapping • Apply a contour map of a part of faculty in lab • Using computer program solving contour map problems (Surfer)	**1, 7**	**A1.1, A1.4, A2.2, D1.1, D3.1**
5	**Lectures:** • Area and Volumes • Computations of areas and volumes of earth work in construction sites networks **Labs/Tutorials:** • Quiz: calculations of leveling problems • Discuss problems of earth work volumes	**1, 7**	**A1.2, A1.4, A2.1, A2.2, D1.1, D2.1, D3.1**
6	• Midterm	**1, 7**	**A1.2, A1.4, A2.1, A2.2, D1.1, D2.1, D3.1**
7	**Lectures:** • Horizontal control networks for construction sites **Labs/Tutorials:** Discuss problems of earth work volumes	**1, 7**	**A1.3, A1.5, A2.1, A2.2, D2.1, D3.1**
8	**Lectures:** • Lengths and angles • Azimuths and bearings **Labs/Tutorials:** • Discuss problems of traverse	**1, 7**	**A1.2, A1.5, A2.1, D1.1, D2.1**
9	**Lectures:** • Theodolite ,Total stations field work and applications • Traverse field procedure	**1, 7**	**A1.4, A1.5, A2.1, A2.2, D1.1, D2.1**

	• Computations and adjustment of closed and connected traverse **Labs/Tutorials:** • Discuss and solve problems of traverse • Lab application using angle distance instruments (Theodolite)		
10	• Final laboratory examination	**1, 7**	**D1.1, D2.1, D3.1**

Course: “Plane Surveying & Topography -BSM 222”	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Define the basic needs for surveying in civil engineering projects.
	A1.2 Describe the fundamentals of surveying and topographic mapping.
	A1.3 Use the different types of levelling and different angle distance instruments.
	A1.4 Carry out mathematical computations for levelling, profile, cross section and contour mapping applications**.**
	A1.5 Carry out closed and connected traverse computations**.**
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Predict the accuracy of a set of measurements.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Surveying, Measurements, and Mechanical and Electrical Design.	A2.2 Assess and comment on surveying data and results.
D2. Demonstrate knowledge, understanding, and utilization of plane and topographical surveying techniques, processes and equipment, photogrammetry and the Global Positioning system (GPS) in engineering projects.	D1.1 Create a Plan for conducting survey works for different civil engineering projects.

D3. Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	D2.1 Carry out field work in team group.

Course Coordinator: Dr. Eng. Marwa Azzam

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1 Basic Information

Program Title	Natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Chemical Engineering		
Course Code	HUM 292		
Year / Level / Semester	Second Year (Junior)		
Prerequisite	None		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

2 Course aims:

No.	**aim**
9	Lead, manage, and supervise a group with skills about financial effects of engineering decisions by estimating and comparing the cost and concept of time value of money, the projection of future cash flows.

3 Learning Outcomes (LOs):

A3.1	Describe Basic practical insight of the principles of Engineering Economics
A6.1	Conduct the financial effects of engineering decisions by estimating and comparing the cost and concept of time value of money.
A6.2	Differentiating between direct and indirect costs.
A9.1	Discover the selection of appropriate investment assessment methods.
D5.1	Investigate the use of financial statements and financing alternatives to pay for proposed engineering projects.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Practical insight of the principles of Engineering Economics.	**1**
2	**Lectures** • The analysis of the financial effects of engineering decisions.	**2**
3	**Lectures** • Estimating and comparing the cost and concept of time value of money.	**3-4**
4	**Lectures** • The projection of future cash flows of revenues and expenses.	**5**
5	**Lectures** • Computations of rates of return.	**6**
6	**Lectures:** • The selection of appropriate investment assessment methods: present value, internal rate of return, and economic value added	**7-8**
7	**Midterm**	**9**
9	**Lectures**	**10**

	- The treatment of various cash flows.	
10	**Lectures** - Depreciation and taxes.	**11**
11	**Lectures** - Direct and indirect costs.	**12**
12	**Lectures** - The analysis of financial statements and financing alternatives.	**13-14**

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A3.1	x			x	x			x							
	A6.1	x			x	x		x								
	A6.2	x			x			x								
	A9.1	x			x	x		x	x							
D-Level	D5.1	x			x			x				x	x		x	

6 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online/offline lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A6.1, A6.2,A9.1
2	Project	A3.1, A6.1, A6.2,A9.1
3	Formative (quizzes- online quizzes- presentation.)	A6.2, A9.1,D5.1
4	Final Term Examination (written)	A3.1, A6.1, A6.2,A9.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Project	15
3	Formative (quizzes- online quizzes- presentation.)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Project	15
3	Formative (quizzes- online quizzes- presentation.)	15
4	Final Term Examination (written)	50
Total		100%

8 List of References

No.	Reference List
1	N. M. Fraser and E. M. Jewkes, Engineering Economics: : Financial Decision Making for Engineers, 5th edition, Pearson, Toronto, Ontario, 2013
2	D. G. Newnan, J. Whittaker, T. G. Eschenbach and J. P. Lavelle, Engineering Economic Analysis, 3rd edition, Don Mills, Toronto, Ontario, 2014.
3	J. A. White, K. E. Case and D. B. Pratt, Principles of Engineering Economic Analysis, 5th edition, Hoboken, NJ, USA, 2010.

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures:** • Practical insight of the principles of Engineering Economics.	**9**	A3.1,A6.1, A6.2,

2	**Lectures** • The analysis of the financial effects of engineering decisions**.**	**9**	A6.1, A6.2,A9.1, D5.1
3	**Lectures** Estimating and comparing the cost and concept of time value of money.	**9**	A3.1,A6.1, A6.2,A9.1,
4	**Lectures** • The projection of future cash flows of revenues and expenses.	**9**	A6.2,A9.1
5	**Lectures** • Computations of rates of return.	**9**	A3.1,A6.1, A6.2,A9.1, D5.1
6	**Lectures:** • The selection of appropriate investment assessment methods: present value, internal rate of return, and economic value added	**9**	A3.1,A6.1, A6.2 , D5.1
7	**Midterm**	**9**	A3.1,A6.1, A6.2,A9.1
8	**Lectures** • The treatment of various cash flows.	**9**	A3.1,A6.1, A6.2,A9.1, D5.1
9	**Lectures** • Depreciation and taxes.	**9**	A3.1,A6.1, A6.2, D5.1
10	**Lectures** • Direct and indirect costs.	**9**	A6.1, A6.2,A9.1, D5.1

Course: “Engineering Ecoomics-HUM292”	
Program LOs	**Course Los**
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	**A3.1** Describe Basic practical insight of the principles of Engineering Economics
A6. Plan, supervise and monitor implementation of engineering projects.	**A6.1** Conduct the financial effects of engineering decisions by estimating and comparing the cost and concept of time value of money. **A6.2** Differentiating between direct and indirect costs.
A9. Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	**A9.1** Discover the selection of appropriate investment assessment methods.
D5. Demonstrate basic organizational and project management skills.	**D5.1** Investigate the use of financial statements and financing alternatives to pay for proposed engineering projects.

Course Coordinator: Assoc. Prof. / Mohamed Ismaeil

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

11 Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">Natural Gas Engineering</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Chemical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Chemical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">HUM 294 / Management and Marketing</td></tr>
<tr><td>Year / Level / Semester</td><td colspan="3">Second Year (Junior)</td></tr>
<tr><td>Prerequisite</td><td colspan="3">None</td></tr>
<tr><td>Specialization</td><td colspan="3">Minor</td></tr>
<tr><td rowspan="2">Teaching Hours / Bylaw 2012</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>-</td><td>-</td></tr>
</table>

12 Course aims:

No.	aim
4	Use contemporary engineering tools, techniques, and skills to recognize the concepts, principles, problems, and applications of marketing and management.

13 Learning Outcomes (LOs):

A7.1	Analyze the importance of social responsibility and ethics on marketing.
A7.2	Identify environmental factors that affect both global and domestic marketing decisions.
A9.1	Explain the concepts of the marketing mix in the development of marketing strategy and tactics.
A9.2	Analyze the importance of social responsibility and ethics on marketing.
A10.1	Apply essential marketing concepts to research and write a strategic marketing plan.
D5.1	Ability to apply knowledge and skills to real-world experiences in an internship.

14 Course Contents:

No.	Topics	Week
1	**Lectures:** • An Overview of Marketing.	**1**
2	**Lectures:** • Strategic Planning for Competitive Advantage.	**2**
3	**Lectures:** • Social Responsibility, Ethics, and the Marketing Environment.	**3-4**
4	**Lectures:** • Developing a Global Vision.	**5**
5	**Lectures:** • Consumer Decision Making.	**6**
6	**Lectures:** • Business Marketing.	**7**
7	**Lectures:** • Segmenting and Targeting Markets.	**8**
8	**Midterm**	**9**

9	**Lectures:** • Product Concepts.	**10**
10	**Lectures:** • Services and Non-profit Organization Marketing.	**11**
11	**Lectures:** • Marketing Channels and Supply Chain Management.	**12**
12	**Lectures:** • Advertising and Public Relations.	**13**
13	**Lectures:** • Sales Promotion and Personal Selling. • Pricing Concepts.	**14**

15 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A7.1	**x**			**x**	**x**							**x**			
	A7.2	**x**			**x**	**x**		**x**					**x**			
	A9.1	**x**			**x**			**x**	**x**				**x**			
	A9.2	**x**			**x**	**x**		**x**	**x**				**x**			
	A10.1	**x**			**x**					**x**						
D-Level	D5.1	**x**			**x**							**x**	**x**			

16 Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online/Offline lectures and assignments

17 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A7.1, A7.2, A9.1, A9.2
2	Project	A7.1, A7.2, A9.1, A9.2, A10.1, D5.1
3	Formative (quizzes- online quizzes-presentation.)	A7.1, A7.2, A9.1, A9.2, A10.1, D5.1
4	Final Term Examination (written)	A7.1, A7.2, A9.1, A9.2, A10.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Project	15
3	Formative (quizzes- online quizzes-presentation.)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Project	20
3	Formative (quizzes- online quizzes-presentation.)	10
4	Final Term Examination (written)	50
Total		100%

18 List of References

No.	Reference List
1	**Essential books (text books)** Lamb, Hair and McDaniel, MKTG, South-Western Publishing .U.S.A. 2009.
2	**Recommended books.** Kotler, Philip , Kevin Lane Keller ,Marketing management, Prentice hall, Europe, 2008.
3	**Periodicals, Web sites, etc** http://marketing.about.com http://www.slideshare.net http://www.knowthis.com http://www.studymarketing.org Course Prof:Dr: - Kotler, Philip , Kevin Lane Keller ,Marketing management, Prentice hall, Europe,2008.

19 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

20 Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO’s
1	**Lectures:** • An Overview of Marketing.	**4**	A7.1, A7.2, A9.1, A9.2
2	**Lectures:** • Strategic Planning for Competitive Advantage.	**4**	A7.1, A7.2, A9.1, A9.2
3	**Lectures:** Social Responsibility, Ethics, and the Marketing Environment.	**4**	A7.1, A7.2, A9.1, A9.2, A10.1, D5.1
4	**Lectures:** • Developing a Global Vision.	**4**	A7.1, A9.2, A10.1, D5.1
5	**Lectures:** • Consumer Decision Making.	**4**	A7.1, A7.2,A10.1, D5.1
6	**Lectures:** • Business Marketing.	**4**	A7.1, A9.1, A9.2, A10.1, D5.1
7	**Lectures:** Segmenting and Targeting Markets.	**4**	A7.2, A9.1, A9.2, A10.1, D5.1
8	• **Midterm**	**4**	A7.1, A7.2, A9.1, A9.2, D5.1
9	**Lectures:** • Product Concepts.	**4**	A7.1, A10.1, D5.1
10	**Lectures:** • Services and Non-profit Organization Marketing.	**4**	A7.1, A7.2, A9.1, A9.2
11	**Lectures:** • Marketing Channels and Supply Chain Management.	**4**	A7.1, A9.1, A9.2, A10.1
12	**Lectures:** • Advertising and Public Relations.	**4**	A7.1, A7.2, A9.1, D5.1
13	**Lectures:** • Sales Promotion and Personal Selling. • Pricing Concepts.	**4**	A7.1, A7.2, A9.1, A9.2, A10.1

Course: “Management and Marketing-HUM 294”	
Program LOs	**Course Los**
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	**A7.1** Analyze the importance of social responsibility and ethics on marketing. **A7.2** Identify environmental factors that affect both global and domestic marketing decisions.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	**A9.1** Explain the concepts of the marketing mix in the development of marketing strategy and tactics. **A9.2** Analyze the importance of social responsibility and ethics on marketing.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	**A10.1** Apply essential marketing concepts to research and write a strategic marketing plan.
D5. Demonstrate basic organizational and project management skills.	**D5.1** Ability to apply knowledge and skills to real-world experiences in an internship.

Course Coordinator: Dr. Mona Hammouda

Program Coordinator: Assoc. Prof. Mohamed Bassiony

Head of Department: Prof. Dr. Hassan El-Ghattass

Approval Date: 28 / 3 / 2021

1. Basic Information:

<table>
<tr><td>Program Title</td><td colspan="3">NGEP</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Chemical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Mechanical Power Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">NGP 311/ Heat transfer and Heat Exchanger</td></tr>
<tr><td>Year/ Level</td><td colspan="3">3rd Level (Senior I)</td></tr>
<tr><td>Specialization</td><td colspan="3">Major</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>2</td><td>3</td></tr>
</table>

2. Course aims:

No.	Aim
1	Apply the knowledge of mathematics, thermo-dynamics and specialized skills with analytic, critical and systemic thinking to identify and solve engineering problems in heat transfer applications.

3. Learning Outcomes (LO's):

Course: Heat transfer and Heat Exchanger	
A2.1.	Select the suitable solution method for conduction heat transfer problems based on the governing differential equations together with the boundary conditions and Recognize the mechanisms of heat transfer by conduction, convection, and radiation.
A10.2.	Practice researching the mechanisms of heat transfer by conduction, convection, and radiation in two and three dimensions.
D1.1.	Apply the knowledge of mathematics and thermo-dynamics to derive the differential equations that govern heat conduction in different geometries.
D9.1.	Exchange knowledge and skills with engineering community and industry in heat transfer applications.
D11.1.	Distinguish the key radiation processes (absorption, reflection and transmission, irradiation), the radiative properties (emissivity, absorptivity, reflectively), radiation shape factors, and rate equation (Stefan-Boltzmann law).

4. Course Contents:

No.	Topics	Week
1	Introduction to heat transfer (heat and other form of energy)	1
2	Steady heat conduction though plane wall, cylindrical wall& spherical wall	2-5
3	Radiation properties – black and gray bodies- Radiation shape factor	6-7
4	Heat exchange between Non-blackbodies Free Convection	8
5	Midterm Exam	9
6	Forced Convection (External Flow)- Forced Convection (internal Flow)	10-11
7	Free convection	12
8	Heat Exchangers types- Heat Exchangers Calculation	13-14
9	Evaporators, Condensers, distillers	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A2.1**	X		X		X	X								X
	A10.1	X	X	X		X	X								
D-Level	**D1.1**	X		X		X	X								
	D9.1	X				X	X								
	D11.1	X				X									

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO’s
1	Mid Term Examination (written/ online)	A2.1,D1.1
2	Practical Examination	A2.1,D1.1,D9.1
3	Oral Examination	D11.1
4	Formative (quizzes- online quizzes- presentation)	A2.1,A10.2,D1.1,D9.1
5	Final Term Examination (written)	A2.1 ,D1.1,D11.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	10
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	25
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Dhar, P. L. Thermal System Design and Simulation (1st ed.). Academic Press (2016).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities

3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction to heat transfer (heat and other form of energy)	1	A2.1,A10.2
2	Steady heat conduction though plane wall, cylindrical wall& spherical wall	1	A2.1,A10.2,D1.1
3	Radiation properties – black and gray bodies- Radiation shape factor	1	A2.1,D11.1
4	Heat exchange between Non-blackbodies Free Convection	1	A2.1,D1.1,D9.1,D11.1
5	Midterm Exam	1	A2.1,D1.1
6	Forced Convection (External Flow)-Forced Convection (internal Flow)	1	A2.1,A10..2,D1.1
7	Free convection	1	A2.1,A10..2,D1.1
8	Heat Exchangers types- Heat Exchangers Calculation	1	A2.1,A10.2,D9.1
9	Evaporators, Condensers, distillers	1	A2.1,D9.1

Course: Heat transfer and Heat Exchanger	
Program LO’s	**Course LO’s**
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Select the suitable solution method for conduction heat transfer problems based on the governing differential equations together with the boundary conditions and Recognize the mechanisms of heat transfer by conduction, convection, and radiation.
A10. Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.	A10.2 Practice researching the mechanisms of heat transfer by conduction, convection, and radiation in two and three dimensions.
D1. Understand systems applicable to engineering by applying the concepts of:	D1.1 Apply the knowledge of mathematics and thermo-dynamics to

Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Measurements, and Mechanical Design.	derive the differential equations that govern heat conduction in different geometries.
D9. Exchange knowledge and skills with engineering community and industry.	D9.1 Exchange knowledge and skills with engineering community and industry in heat transfer applications.
D11. Practice the neatness and aesthetics in design and approach.	D11.1 Distinguish the key radiation processes (absorption, reflection and transmission, irradiation), the radiative properties (emissivity, absorptivity, reflectively), radiation shape factors, and rate equation (Stefan-Boltzmann law).

Course Coordinator: Prof. Dr. Kamal Mourad

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Mechanical Engineering		
Course Code	**NGP312/ Multiphase Flow**		
Year/ Level	3rd Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	3	2	-

2. Course aims:

No.	Aim
1	Apply multiphase correlations, energy equation and flow regimes to identify and solve multiphase flow problems in natural gas industry.

3. Learning Outcomes (LO's):

Course: Multiphase Flow	
A4.1.	Identify various techniques used in mass transfer equipment in multiphase flow applications.
A4.2.	Describe codes of practice, design, the assessment of safety and environmental risks, and the legislative framework for safety.
A6.1.	Design the pipeline segment of a multiphase flow system and Asses the multiphase flow pattern using the flow pattern maps.
D1.1.	Identify the different regimes of multiphase flow.
D1.2.	Explain the behavior of different types of multiphase flows.
D8.1.	Apply the energy equation on the multiphase flow problems and design the pipeline segment of a multiphase flow system.

4. Course Contents:

No.	Topics	Week
1	Introduction, States of Matter, Matter response to shear stress, Basic Concepts of Fluid.	1-2
2	Fluid Dynamics, Flow Regimes, Reynolds Number, Fluid Flow Basic Equations, Flow Classification and Flow Characterization.	2-4
3	Fundamentals of multiphase flow I: Classifications of multiphase flows. Applications of multiphase flows.	5-6
4	Fundamentals of multiphase Flow II: Terminology. Fundamental equations.	7-8
5	Midterm Exam	9
6	Gas-liquid two phase flow I: Horizontal flow patterns. Vertical flow patterns.	10
7	Gas-liquid two phase flow II: Flow pattern maps. Void fraction. Pressure drops.	12
8	Solid-fluid two phase flow I: Pneumatic conveying	13-14
9	Solid-fluid two phase flow II: Pipeline hydraulic transport of slurries	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A4.1**	X	X			X	X								
	A4.2	X	X			X	X								
	A6.1	X				X	X								
D-Level	**D1.1**	X		X		X									
	D1.2	X		X		X									
	D8.1	X				X	X								

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A4.1,A6.1,D1.1,D1.2
2	Practical Examination	-
3	Oral Examination	A4.1,A4.2,D1.1,D1.2
4	Formative (quizzes- online quizzes-presentation)	A4.1,A6.1,D1.1,D1.2,D8.1
5	Final Term Examination (written)	A4.1,A6.1,D1.1,D1.2,D8.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Yadigaroglu, G., & Hewitt, G. F. Introduction to Multiphase Flow. Springer Publishing (2017).
2	Abraham, J. P. All Fluid-Flow-Regimes Simulation Model for Internal Flows. Macmillan Publishers (2011).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction, States of Matter, Matter response to shear stress, Basic Concepts of Fluid.	1	A4.1,A4.2,D8.1
2	Fluid Dynamics, Flow Regimes, Reynolds Number, Fluid Flow Basic Equations, Flow Classification and Flow Characterization.	1	A4.1,A6.1,D.1.1
3	Fundamentals of multiphase flow I: Classifications of multiphase flows. Applications of multiphase flows.	1	A4.1,D1.1
4	Fundamentals of multiphase Flow II: Terminology. Fundamental equations.	1	A4.1,D1.1,A8.1
5	Midterm Exam	1	A4.1,A6.1,D1.1,D1.2
6	Gas-liquid two phase flow I: Horizontal flow patterns. Vertical flow patterns.	1	A4.1,D1.1,D1.2
7	Gas-liquid two phase flow II: Flow pattern maps. Void fraction. Pressure drop.	1	A6.1.D8.1
8	Solid-fluid two phase flow I: Pneumatic conveying	1	A4.1,A4.2,D1.1
9	Solid-fluid two phase flow II: Pipeline hydraulic transport of slurries	1	A4.1,A6.1,D1.2,D8.1

Course: Multiphase Flow	
Program LO’s	**Course LO’s**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health	A4.1 Identify various techniques used in mass transfer equipment in multiphase flow applications.

and safety requirements, environmental issues, and risk management principles.	A4.2 Describe codes of practice, design, the assessment of safety and environmental risks, and the legislative framework for safety.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Design the pipeline segment of a multiphase flow system and Asses the multiphase flow pattern using the flow pattern maps
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Measurements, and Mechanical Design.	D1.1 Identify the different regimes of multiphase flow.
	D1.2 Explain the behavior of different types of multiphase flows.
D8. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	D8.1 Apply the energy equation on the multiphase flow problems and design the pipeline segment of a multiphase flow system.

Course Coordinator: Dr. Hamada Gad

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Chemical Engineering		
Course Code	**NGP313/ Gas Reservoir Engineering**		
Year/ Level	3rd year		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
7	Apply analytical, experimental knowledge in natural gas reservoirs with proficiency aided by using modern software to evaluate the performance of natural gas reservoirs

3. Learning Outcomes (LO's):

A1.1.	State the fundamentals of reservoir fluids and its properties Describe reservoir fluid and rock properties and Identify the material balance equation to predict the type of reservoir fluid and recovery factor.
A2.1.	Calculate the IGIP by volumetric and material balance.
A2.2.	Evaluate productivity index and reservoir performance.
D13.1.	Identify the material balance equation to predict the type of reservoir fluid and recovery factor; and Evaluate the original hydrocarbon in place by predicting the recovery factor using charts.
D17.1.	Practice an analysis method and use a software for reservoir simulation to enhance prediction of recovery.
D20.1.	Design a model by using Software for reservoir simulation (Prosper).

4. Course Contents:

No.	Topics	Week
1	Introduction, the roles of the geoscientist and petroleum engineer, basic principles and terminology of oil production	1
2	Rock properties, effective porosity and permeability, relative permeability, capillary pressure data, formation compressibility	2
3	Basis and significance of hydrocarbon resource estimation classifications Resource Assessment	3

4	Different techniques to calculate the resource / reserve in an oil or gas field including the use and applicability of different data types.	4
5	Hydrocarbon fluid properties, the nature of hydrocarbons	5
6	Reservoir recovery mechanisms, primary recovery, secondary recovery, tertiary recovery.	6
7	Dynamics of an oil or gas field	7
8	Midterm Exam	8
9	Well performance prediction, Well testing	9
10	Reservoir simulation and performance prediction, Analytical models, Simulation models	10
11	Phase behavior and PVT analysis, fluid types defined in terms of phase diagrams, reservoir fluid properties, the material balance equation	11
12	Well inflow performance, Artificial lift	12
13	Recovery Factor Estimation	13
14	Fundamentals, Principles and Applications of Petroleum Economics as they are applied and used across the Exploration and Production value chain	14-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	X				X	X								
	A2.1	X				X	X								
	A2.2	X	X	X	X	X	X								
D-Level	**D13.1**	X	X			X	X								
	D17.1	X	X			X	X								
	D20.1	X		X		X								X	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1,A2.1,A2.2,D13.1
2	Practical Examination	-
3	Oral Examination	A1.1,D13.1
4	Formative (quizzes- online quizzes- presentation)	A1.1,A2.1,A2.2,D13.1,D17.1, D20.1
5	Final Term Examination (written)	A1.1,A2.1,A2.2,D13.1,D17.1, D20.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Ahmed, Tarek H. Reservoir Engineering Handbook. 4th Edition. Gulf Professional Publishing, (2010).
2	Ahmed, Tarek H., and Meehan, Nathan. Advanced Reservoir Engineering and Management. 2nd edition. Gulf Professional Publishing, (2011).
3	Baker, R. O., Yarranton, H. W., & Jensen, J. Practical Reservoir Engineering and Characterization (1st ed.). Gulf Professional Publishing (2015).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction, the roles of the geoscientist and petroleum engineer, basic principles and terminology of oil production	7	A1.1,A2.1,D13.1
2	Rock properties, effective porosity and permeability, relative permeability, capillary pressure data, formation compressibility	7	A1.1,D13.1
3	Basis and significance of hydrocarbon resource estimation classifications Resource Assessment	7	A1.1,D13.1
4	Different techniques to calculate the resource / reserve in an oil or gas field including the use and applicability of different data types.	7	A2.2,D17.1,D20.1
5	Hydrocarbon fluid properties, the nature of hydrocarbons	7	A1.1,D13.1
6	Reservoir recovery mechanisms, primary recovery, secondary recovery, tertiary recovery.	7	A2.1,D17.2
7	Dynamics of an oil or gas field	7	1A1.1.D13.1
8	Midterm Exam	7	A1.1,A2.1,A2.2,D13.1
9	Well performance prediction, Well testing	7	A2.1,A2.2,D13.1,D17.1

10	Reservoir simulation and performance prediction, Analytical models, Simulation models	7	A2.2,D17.1,D20.1
11	Phase behavior and PVT analysis, fluid types defined in terms of phase diagrams, reservoir fluid properties, the material balance equation	7	A2.1,A2.2,D13.1
12	Well inflow performance, Artificial lift	7	A2.1,A2.2,D17.1
13	Recovery Factor Estimation	7	A2.2,D13.1
14	Fundamentals, Principles and Applications of Petroleum Economics as they are applied and used across the Exploration and Production value chain	7	A1.1,A2.1,D13.1

Course: Gas Reservoir Engineering	
Program LO’s	**Course LO’s**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1. State the fundamentals of reservoir fluids and its properties, describe reservoir fluid, and rock properties and Identify the material balance equation to predict the type of reservoir fluid and recovery factor.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Calculate the IGIP by volumetric and material balance.
	A2.2 Evaluate productivity index and reservoir performance.
D13. Analyze geological data, interpret well-logs, estimate hydrocarbon reserves and evaluate reservoir performance by applying the principles and basic concepts of geology, geophysics and reservoir engineering.	D13.1 Identify the material balance equation to predict the type of reservoir fluid and recovery factor; and Evaluate the original hydrocarbon in place by predicting the recovery factor using charts.
D17. Select appropriate solutions for engineering problems and enhanced gas recovery based on analytical thinking and Select appropriate mathematical and computer-based methods for modeling and analyzing problems.	D17.1 Practice an analysis method and use a software for reservoir simulation to enhance prediction of recovery.

D20. Create and/or re-design a process, component or system, and carry out specialized engineering designs related to gas reservoir and well drilling and completion.	D20.1 Design a model by using Software for reservoir simulation (Prosper).

Course Coordinator: Dr. Attia Mohamed Attia

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP314/ Gas Turbomachinery**		
Year/ Level	3rd year		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	3	2	-

2. Course aims:

No.	Aim
7	Apply analytical of mathematics, thermo-dynamics and fluid mechanics to analyze and solve engineering problems in turbomachines and compressors applications.

3. Learning Outcomes (LO's):

A1.1.	Identify the different types of turbomachines and recognize the elements used in stream turbines, gas turbines, fans, and air compressors.
A1.2.	Describe the principle working of turbomachines.
A2.1.	Design and perform experiments on impulse and reaction turbines, air compressors and fans.
D1.1.	Select the suitable measuring scheme for pressure and velocity for different types of turbomachines.
D4.1.	Analyze the problems concerning turbomachines and asses the consequences of it.

4. Course Contents:

No.	Topics	Week
1	1. Introduction: Dimensional Analysis—Basic Thermodynamics and Fluid Mechanics 1.1 Introduction to Turbomachinery, Types of Turbomachines, Compressible Flow machines 1.2 Basic Thermodynamics, Fluid Mechanics, and Definitions of Efficiency	1
2	1.3 Continuity Equation 1.4 The First Law of Thermodynamics 1.5 Newton’s Second Law of Motion 1.6 The Second Law of Thermodynamics: Entropy	2
3	1.7 Efficiency and Losses of Steam and Gas Turbines, Fans, and air Compressors 1.8 Nozzle and diffuser Efficiency, Energy Transfer in Turbomachinery, The Euler Turbine Equation. 1.9 Examples and Problems.	3-4
4	2. Steam Turbines 2.1 Introduction, Steam Nozzles, Nozzle Efficiency 2.2The Reheat Factor. 2.3 Metastable Equilibrium	5
5	2.4 Stage Design 2.5 Impulse Stage 2.6 The Impulse Steam Turbine 2.7 Reaction Turbine	6
6	2.8 Pressure Compounding (The Rateau Turbine) 2.9 Velocity Compounding (The Curtis Turbine),	7

7	2.10 Axial Flow Steam Turbines, Degree of Reaction. 2.11 Cascade design 2.12 Illustrative example and solved problems	8
8	Midterm written examination	9
9	3. Axial Flow and Radial Flow Gas Turbines 3.1 Introduction to Axial Flow Turbines, 3.2 Velocity Triangles and Work Output	10
10	3.3 Degree of Reaction 3.4 Blade-Loading Coefficient, Stator (Nozzle) and Rotor Losses	11
11	3.5 Radial Flow Turbine, Velocity Diagrams and Thermodynamic, Analysis 3.6 Turbine Efficiency, Application of Specific Speed 3.7 Illustrative example and solved problems.	12-13
12	4. Axial Flow Compressors and Fans 4.1 Introduction, Velocity Diagram, Degree of Reaction, Stage Loading, Lift-and-Drag Coefficients 4.2 Cascade Nomenclature and Terminology	14
13	4.3 Multi-Stage Performance 4.4 Axial Flow Compressor Characteristics	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
	A1.1	**X**		**X**											

A-	**A1.2**	**X**		**X**											
	A2.1	**X**	**X**		**X**		**X**								
D-Level	**D1.1**	**X**	**X**				**X**								
	D4.1	**X**					**X**								

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A1.1,A1.2,D1.1
2	Practical Examination	-
3	Oral Examination	A1.1,A1.2
4	Formative (quizzes- online quizzes- presentation)	A1.1,1.2,A2.1,D4.1
5	Final Term Examination (written)	A1.1,1.2,A2.1,D1.1, D4.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Gas Turbine Engineering Handbook By eherwan P. Boyce, 2011

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	1. Introduction: Dimensional Analysis—Basic Thermodynamics and Fluid Mechanics 1.1 Introduction to Turbomachinery, Types of Turbomachines, Compressible Flow machines 1.2 Basic Thermodynamics, Fluid Mechanics, and Definitions of Efficiency	7	A1.1,A1.2
2	1.3 Continuity Equation 1.4 The First Law of Thermodynamics 1.5 Newton’s Second Law of Motion 1.6 The Second Law of Thermodynamics: Entropy	7	A1.1,A1.2
3	1.7 Efficiency and Losses of Steam and Gas Turbines, Fans, and air Compressors 1.8 Nozzle and diffuser Efficiency, Energy Transfer in Turbomachinery, The Euler Turbine Equation 1.9 Examples and Problems.	7	A1.2,A2.1,D1.1

4	2. Steam Turbines 2.1 Introduction, Steam Nozzles, Nozzle Efficiency 2.2The Reheat Factor 2.3 Metastable Equilibrium	7	A1.1,DA2.1.D4.1
5	2.4 Stage Design 2.5 Impulse Stage 2.6 The Impulse Steam Turbine 2.7 Reaction Turbine	7	A2.1,D1.1,D4.1
6	2.8 Pressure Compounding (The Rateau Turbine) 2.9 Velocity Compounding (The Curtis Turbine),	7	A1.2,D1.1
7	2.10 Axial Flow Steam Turbines, Degree of Reaction. 2.11 Cascade design 2.12 Illustrative example and solved problems	7	A1.2,A2.1,D1.1
8	Midterm written examination	7	A1.1,A1.2,D1.1
9	3. Axial Flow and Radial Flow Gas Turbines 3.1 Introduction to Axial Flow Turbines, 3.2 Velocity Triangles and Work Output		A1.1,A1.2,D4.1
10	3.3 Degree of Reaction 3.4 Blade-Loading Coefficient, Stator (Nozzle) and Rotor Losses	7	A1.2,D2.1,D1.1
11	3.5 Radial Flow Turbine, Velocity Diagrams and Thermodynamic, Analysis 3.6 Turbine Efficiency, Application of Specific Speed 3.7 Illustrative example and solved problems.	7	A2.1,D1.1,D4.1

12	4. Axial Flow Compressors and Fans 4.1 Introduction, Velocity Diagram, Degree of Reaction, Stage Loading, Lift-and-Drag Coefficients 4.2 Cascade Nomenclature and Terminology	7	A1.1,D2.1
13	4.3 Multi-Stage Performance 4.4 Axial Flow Compressor Characteristics	7	A1.2,A2.1,D1.1

Course: Gas Turbomachinery	
Program LO's	**Course LO's**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1 Identify the different types of turbomachines and recognize the elements used in stream turbines, gas turbines, fans, and air compressors.
	A1.2 Describe the principle working of turbomachines.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Design and perform experiments on impulse and reaction turbines, air compressors and fans.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Measurements, and Mechanical Design.	D1.1 Select the suitable measuring scheme for pressure and velocity for different types of turbomachines.
D4. Demonstrate additional abilities to select appropriate system, analyze, and design using the most up-to-date analytical tools, techniques, equipment, and software packages.	D4.1 Analyze the problems concerning turbomachines and asses the consequences of it.

Course Coordinator: Dr. Atef Allam Elden

Program Coordinator: Prof. Dr. Mohamed Bassyouni

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	Chemical Engineering		
Course Code	**NGP321/ Gas Process Engineering**		
Year/ Level	3rd level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	3	2	-

2. Course aims:

No.	Aim
6	Act professionally in design and supervision of natural gas process operations
8	Use the modern technologies and material safety data sheets while designing and handling natural gas projects.

3. Learning Outcomes (LO's):

A.3.1	Describe the selection and evaluation of different processes related to natural gas processing.
A4.1	Work in stressful environment and within constraints.
A.7.1	Develop numerical model to describe the flow of natural gas through pipeline networks.
D.8.1	Analyze and draw the typical PFDs and P&IDs of different processes involved in natural gas processing.
D8.2	Use MS-excel to perform NG properties calculations and design procedures.
D.16.1	Identify the natural gas transmission process including the pipeline and compression station calculations and liquid transportation.
D.21.1	Present number of common problems involved in natural gas industry and their troubleshooting procedures.

4. Course Contents:

No.	Topics	Week
1	Introduction about natural gas and natural gas properties	1
2	Fundamentals of natural gas processing	2-3
3	Piping and instrumentation diagrams	4-5
4	Separation and separator sizing	6-7
5	Natural gas sweetening and treatment	8
6	Midterm	9
7	Natural gas dehydration	10-11
8	Hydrocarbon recovery (refrigeration and fractionation)	12-13
9	Pumping operations and calculations	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A3.1**	X	X	X											
	A4.1	X	X		X	X									
	A7.1	X	X	X	X	X									
D-Level	**D8.1**	X	X		X	X									
	D8.2	X	X	X	X	X									
	D16.1	X	X												
	D21.1	X	X												

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1 / A4.1 / A7.1
2	Practical Oral Examination	-
3	Oral Examination	A3.1/D16.1
4	Formative (quizzes- online quizzes- presentation)	D8.1 / D8.2 /D16.1/ D21.1
5	Final Term Examination (written)	A3.1 / A4.1 / A7.1 / D8.1 / D8.2 /D16.1/ D21.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Mokhatab, S., Mak, J. Y., Valappil, J., & Wood, D. A. Handbook of Liquefied Natural Gas (1st ed.). Gulf Professional Publishing (2013).
2	Bahadori, A. Natural Gas Processing: Technology and Engineering Design (1st ed.). Gulf Professional Publishing (2014).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction about natural gas and natural gas properties	8	A.3.1
2	Fundamentals of natural gas processing	8	A.4.1
3	Piping and instrumentation diagrams	6	A.3.1 / A.4.1
4	Separation and separator sizing	6	A.7.1
5	Natural gas sweetening and treatment	6	A.7.1
6	Midterm	6/8	A.3.1 / A.4.1 /A.7.1
7	Natural gas dehydration	6	D.8.1 /D8.2
8	Hydrocarbon recovery (refrigeration and fractionation)	6	D.16.1
9	Pumping operations and calculations	8/6	D.21.1

Course: Gas Process Engineering	
Program LO’s	**Course LO’s**
A.3 Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development	A.3.1 Describe the selection and evaluation of different processes related to natural gas processing.
A.4 Utilize contemporary technologies, codes of practice and standards, quality guidelines، health and safety requirements, environmental issues, and risk management principles.	A4.1 Work in stressful environment and within constraints.
A.7 Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	A.7.1 Develop numerical model to describe the flow of natural gas through pipeline networks.
D.8 Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	D.8.1 Analyze and draw the typical PFDs and P&IDs of different processes involved in natural gas processing.
	D8.2 Use MS-excel to perform NG properties calculations and design procedures.
D.16 Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer.	D.16.1 Identify the natural gas transmission process including the pipeline and compression station calculations and liquid transportation.
D.21 Conduct troubleshooting in natural gas processing plants.	D.21.1 Present number of common problems involved in natural gas industry and their troubleshooting procedures.

Course Coordinator: Dr. Ashraf Abd Elkareem

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Mechanical Engineering Department		
Course Code	**NGP322/ Energy Resources**		
Year/ Level	3rd level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	3	2	-

2. Course aims:

No.	**Aim**
1	Apply energy conversion systems, science and specialized skills with analytic, critical and systemic thinking to identify and solve worldwide energy problems.
2	Behave professionally and adhere to engineering ethics and environmental standards to recognize the environmental effect of each type of energy resources.

3. Learning Outcomes (LO's):

A3.1	Apply technical analysis in energy conversion systems.
A3.2	Solve the problems of natural gas combustion.
A3.3	Solve the different engineering problems in fuel combustion and load fluctuation.
A4.1	Recognize the environmental effect of each type of energy resources.
D1.1	Identify the different types of energy resources.
D1.2	Describe the different types of energy resources and applications
D16.1	Investigate Solar Energy Technology, Power Plant and Energy Conservation
D16.2	Define deeply the combustion of fossil fuel and emissions.

4. Course Contents:

No.	**Topics**	**Week**
1	Introduction and Basic Consideration	1-2
2	Combustion of Fossil Fuel	3-4
3	Fuel Cell Technology	5-6
4	Thermoelectric Technology	7
5	Mid -Term Exam	8
6	Solar Energy Technology	9-10
7	Power Plant and Energy Conservation	11-12
8	Power Plant Economics and Fluctuation of Loads in Power Plants	13-14

5. Teaching and Learning Methods:

LO’s		Teaching and Learning Method													
		Lecture	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A3.1	**X**				**X**									
	A3.2	**X**	**X**				**X**								
	A3.3	**X**													
	A4.1	**X**			**X**										
D-Level	D1.1	**X**			**X**		**X**								
	D1.2	**X**					**X**								
	D16.1	**X**									**X**				

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A4.1, A3.1, A3.2, A3.3, D1.1, D1.2
2	Practical Examination	---
3	Oral Examination	A4.1,D1.1,D1.2,D16.2
4	Formative (quizzes- online quizzes- presentation)	A3.1, A3.2, A3.3, A4.1, D1.1, D1.2
5	Final Term Examination (written)	A4.1, A3.1, A3.2, A3.3, D1.1, D1.2, D16.1, D16.2,

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Skipka, K. J., & Theodore, L. Energy Resources: Availability, Management, and Environmental Impacts (Energy and the Environment) (1st ed.). CRC Press (2014).
2	Zheng, C., & Liu, Z. Oxy-fuel Combustion: Fundamentals, Theory and Practice (1st ed.). Academic Press (2017).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction and Basic Consideration	1	D1.1, D1.2, A3.1, A4.1
2	Combustion of Fossil Fuel	2	A4.1, D1.2, A3.1, A3.2, A3.3
3	Fuel Cell Technology	2	D1.2, A4.1, A3.1

4	Thermoelectric Technology	2	A3.1, A3.3, A4.1
5	Mid -Term Exam	1/2	A4.1, A3.1, A3.2, A3.3, D1.1, D1.2
6	Solar Energy Technology	2	D16.1, A3.1, A4.1
7	Power Plant and Energy Conservation	1	A3.1, A3.3, A4.1, D16.2
8	Power Plant Economics and Fluctuation of Loads in Power Plants	2	D16.1, D16.2, D1.2, A4.1, A3.3

Course: Energy Resources	
Program LO's	**Course LO's**
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental، ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.1 Apply technical analysis in energy conversion systems.
	A3.2 Solve the problems of natural gas combustion.
	A3.3 Solve the different engineering problems in fuel combustion and load fluctuation.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Recognize the environmental effect of each type of energy resources.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Surveying, Measurements, and Mechanical and Electrical Design.	D1.1 Identify the different types of energy resources.
	D1.2 Describe the different types of energy resources and applications
D16. Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer .	D16.1 Investigate Solar Energy Technology, Power Plant and Energy Conservation.
	D16.2 Define deeply the combustion of fossil fuel and emissions.

Course Coordinator: Dr. Hamada Mohamed Gad

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP601(Well Logging)**		
Year/ Level	3rd level		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
7	Apply analytical, experimental, design of natural gas reservoir with proficiency aided by modern engineering tools.

3. Learning Outcomes (LO's):

A2.1	Appraise Qualitative and quantitative interpretation, deflection of Gas/Oil contact, detection of Oil/Water contact, calculation of reservoir.
A2.2	Apply density and neutron logs calculation of porosity, lithology.
A2.3	Create GR log, 'detection permeable and impermeable zones, calculation of Vsh
D4.1	Identify basic reservoir petrophysical parameters.
D4.2	Engage in Cooperative and self-learning presentation on GR and Spectral GR log and discussion.
D4.3	Prepare Complete Formation evaluation case study and discussion.
D12.1	Develop Calculation of Rw and Vsh using SP log, SP log corrections and limitations.
D18.1	Define well logging, classification of logs, Caliper log, dip meter log.
D18.2	Outline NMR log principles and application.
D18.3	Describe Drilling hydrocarbon wells and borehole environment.
D18.4	Recognize SP, GR, density, neutron and resistivity logs principles and application,
D18.5	Interpret resistivity logs, determination of permeable and impermeable zones. Calculation of water saturation and hydrocarbon saturation.

4. Course Contents:

No.	Topics	Week
1	Determination of basic reservoir petrophysical parameters.	1
2	Drill in hydrocarbon wells and boiehok- environment.	2
3	Define well logging, classification of logs, Caliper log, dip meter log.	3
4	SP log principles and application.	4
5	calculation of R\v and Vsh using SP log, SP log corrections and limitations.	5
6	GR log principles and application, detection permeable and impermeable zones, calculation of Vsh.	6
7	Student presentation on GR and Spectra! GR log and discussion.	7
8	Midterm Exam	8
9	Density and neutron logs principles and application, calculation of porosity, lithology, detection of Gas/Oil contact.	9-10
10	Sonic log principles and application, its rules in mechanical properties, cement job and seismic survey.	11
11	Resistivity logs classification, principles and applications, determination of permeable and impermeable zones, detection of Oil/Water contact.	12-13
13	Complete Formation evaluation case study and discussion.	14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A2.1	X				X									
	A2.2	X	X				X								
	A2.3	X						X			X				
D-Level	D4.1	X					X								
	D4.2	X					X								
	D4.3	X			X		X				X			X	
	D12.1	X					X							X	
	D18.1	X					X							X	
	D18.2	X			X		X				X			X	

	D18.3	X					X								
	D18.4	X	X												

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A2.1, D4.1, D4.2, D12.1
2	Practical Examination	---
3	Oral Examination	D4.1,D18.1,D18.3,D18.4
4	Formative (quizzes- online quizzes-presentation)	D12.1, D4.1, D18.1, A2.2, A2.3
5	Final Term Examination (written)	A2.1, D4.1, D4.2, D12.1, D18.1, D18.2, A2.3, D4.3, A2.3

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes-presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Liu, H. Principles and Applications of Well Logging. Springer Publishing. (2017).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Determination of basic reservoir petrophysical parameters.	7	D4.1
2	Drill in hydrocarbon wells and boiehok-environment.	7	A2.1
3	Define well logging, classification of logs, Caliper log, dip meter log.	7	D18.1
4	SP log principles and application.	7	D12.1
5	calculation of R\v and Vsh using SP log, SP log corrections and limitations.	7	D12.1
6	GR log principles and application, detection permeable and impermeable zones, calculation of Vsh.	7	D4.2, A2.1
7	Student presentation on GR and Spectra! GR log and discussion.	7	D4.2, A2.3
8	Midterm Exam	7	A2.1, D4.1, D4.2, D12.1
9	Density and neutron logs principles and application, calculation of porosity, lithology, detection of Gas/Oil contact.	7	D18.1, A2.2
11	Sonic log principles and application, its rules in mechanical properties, cement job and seismic survey.	7	D4.1, A2.2
12	Resistivity logs classification, principles and applications, determination of permeable and impermeable zones, detection of Oil/Water contact.	7	A2.1, A2.3

14	Complete Formation evaluation case study and discussion.	7	D4.3

Course: Natural Gas Well Logging	
Program LO’s	**Course LO’s**
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Appraise Qualitative and quantitative interpretation, deflection of Gas/Oil contact, detection of Oil/Water contact, calculation of reservoir.
	A2.2 Apply density and neutron logs calculation of porosity, lithology.
	A2.3 Create GR log, 'detection permeable and impermeable zones, calculation of Vsh.
D4. Demonstrate additional abilities to select appropriate system, analyze, and design using the most up-to-date analytical tools, techniques, equipment, and software packages.	D4.1 Identify basic reservoir petrophysical parameters.
	D4.2 Engage in Cooperative and self-learning presentation on GR and Spectral GR log and discussion.
	D4.3 Prepare Complete Formation evaluation case study and discussion.
D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and Apply quality assurance procedures and follow codes and standards.	D12.1 Develop Calculation of Rw and Vsh using SP log, SP log corrections and limitations.

D18. Evaluate and appraise designs, processes (operations), equipment and machinery, and propose improvements.	D18.1 Define well logging, classification of logs, Caliper log, dip meter log.
	D18.2 Outline NMR log principles and application.
	D18.3 Describe Drilling hydrocarbon wells and borehole environment.
	D18.4 Recognize SP, GR, density, neutron and resistivity logs principles and application,
	D18.5 Interpret resistivity logs, determination of permeable and impermeable zones. Calculation of water saturation and hydrocarbon saturation.

Course Coordinator: Dr. Nabih

Program Coordinator: Prof.Dr. Mohamed Bassyouni

Approval Date: 28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP602 (Oil and Gas Legal Framework)**		
Year/ Level	3^{rd} level		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
5	Master self-learning and long life learning strategies to communicate effectively using different modes ,tools and languages to deal with academic /professional challenges in critical and creative manner .
9	Lead, manage, supervise a group of process and operational engineers, and apply common practice in natural gas industry include historical development of the legal system, terminology, systems and processes in major oil and gas provinces to meet society's requirements of occupational health, safety, and quality standards.

3. Learning Outcomes (LO's):

A4.1	Discuss Topics related to humanitarian interests and moral issues.
A5.1	Apply safe systems at work and observe the appropriate steps to manage risks in gas fields.
D9.1	Apply knowledge and skills with engineering community and industry
D10.1	Recognize professional engineering in society, including health, safety, and environmental issues
D12.1	Evaluate and appraise designs, processes (operations), equipment and machinery, and propose improvements;
D16.1	Create systematic and methodical approaches when dealing with new and advancing technology.

4. Course Contents:

No.	Topics	Week
1	Historical development of the legal system, terminology, systems and processes in major oil and gas provinces	1-3
2	Areas of law applying to the oil and gas industry	4-5
3	Historical and modern approaches to allocating rights to explore in major oil and gas provinces	6
4	Unitization; legal contracts, sub-contracts, farm in and joint venture agreements	7
5	Mid -Term Exam	8

6	Case study - selecting appropriate legal risk reduction measures	9-10
7	The Health and Safety at Work Act; environmental compliance	11-12
8	Third party access regulations; sales contracts; and production sharing contracts	13-14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A4.1	**X**				**X**									
	A5.1	**X**	**X**												
D-Level	D9.1	**X**													
	D10.1	**X**													
	D12.1	**X**			**X**						**X**				
	D16.1	**X**													

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LO's**
1	Mid Term Examination (written/ online)	A4.1, A5.1, D9.1, D10.1, D16.1
2	Practical Examination	---
3	Oral Examination	A4.1,D10.1

4	Formative (quizzes- online quizzes- presentation)	A4.1, A5.1, D9.1, D10.1, D16.1
5	Final Term Examination (written)	A4.1, A5.1, D9.1, D10.1, D16.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Vann, A. Offshore Oil and Gas Development: Legal Framework - Scholar’s Choice Edition. Scholar’s Choice (2015).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Historical development of the legal system, terminology, systems and processes in major oil and gas provinces	9	A4.1, A5.1, D9.1, D10.1, D16.1
2	Areas of law applying to the oil and gas industry	9,5	A4.1, A5.1, D9.1, D10.1, D16.1
3	Historical and modern approaches to allocating rights to explore in major oil and gas provinces	9	A4.1, A5.1, D9.1, D10.1, D16.1
4	Unitization; legal contracts, sub-contracts, farm in and joint venture agreements	9	A4.1, A5.1, D9.1, D10.1, D16.1
5	Mid -Term Exam	9,5	A4.1, A5.1, D9.1, D10.1, D16.1
6	Case study - selecting appropriate legal risk reduction measures	9,5	A4.1, A5.1, D9.1, D10.1, D16.1
7	The Health and Safety at Work Act; environmental compliance	9	A4.1, A5.1, D9.1, D10.1, D16.1
8	Third party access regulations; sales contracts; and production sharing contracts	9	A4.1, A5.1, D9.1, D10.1, D16.1

Course: Oil and Gas Legal Framework	
Program LO’s	**Course LO’s**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Discuss Topics related to humanitarian interests and moral issues.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Apply safe systems at work and observe the appropriate steps to manage risks in gas fields.
D9. Exchange knowledge and skills with engineering community and industry.	D9.1 Apply knowledge and skills with engineering community and industry
D10. Incorporate economic, societal, environmental dimensions and risk management in design.	D10.1 Recognize professional engineering in society, including health, safety, and environmental issues

D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and Apply quality assurance procedures and follow codes and standards.	D12.1 Evaluate and appraise designs, processes (operations), equipment and machinery, and propose improvements.
D16. Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer .	D16.1 Create systematic and methodical approaches when dealing with new and advancing technology.

Course Coordinator: Prof. Dr. Mohamed Bassyouni

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP603 (Offshore Technology)**		
Year/ Level	3rd level		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
2	Behave professionally and adhere to engineering economic standards and work to develop financial skills and promote sustainability principles in natural gas projects.
8	Use the modern technologies and material safety data sheets while designing and handling natural gas projects.

3. Learning Outcomes (LO's):

A3.1	Recognize the applications of riser types, Soars necessary for semi-submersibles as well as for FPSOs.
A3.2	Use the international data to distinguish the advantages and disadvantages of different platform types.
A4.1	Distinguish the environmental aspect and reservoir characteristics and locations of different platform types.
D13.1	Assess economic comparisons between platform types, considering particular locations, environmental and reservoir characteristics.
D14.1	Define the importance of weight and water depth.
D14.2	Design the launching sequence of offshore platforms.
D20.1	Perform calculations of load-out and transportation of natural gas.

4. Course Contents:

No.	Topics	Week
1	Mobile offshore units and offshore platforms	1-2
2	Platform functions and form: the importance of weight and water depth; launched, self-floating and lift-installed jackets	3-4
3	Node design and fabrication; jacket fabrication, load-out and transportation; jacket configuration; topsides configuration governing load cases; in-plane design of jackets including ship impact and fatigue	5
4	Concrete gravity structures for deep and shallow water applications and design issues	6-7

5	Mid -Term Exam	8
6	Floating platforms: tlps, semi-submersibles, fpsos, spars; riser types	9-10
7	Novel and future types of platforms and their applicability	11-12
8	Economic comparison between platform types, considering locations, environmental and reservoir characteristics.	13-14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A3.1	X				X									
	A3.2	X	X				X								
	A4.1	X						X			X				
D-Level	D13.1	X					X								
	D14.1	X					X								
	D14.2	X			X		X				X				
	D20.1	X					X								

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.2, A4.1, D13.1, D14.1, D14.2
2	Practical Examination	---
3	Oral Examination	A3.1,D14.1
4	Formative (quizzes- online quizzes- presentation)	A3.2, A4.1, D13.1, D14.1, D14.2
5	Final Term Examination (written)	D14.1, A3.1, A4.1, A3.2, D14.2, D20.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References

No.	Reference List
1	"Petroleum Engineering". Britannica. Retrieved 3 February 2012.
2	"Drilling Automation". Journal of Petroleum Technology. December 14, 2017.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System

5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	Mobile offshore units and offshore platforms	8	D14.1, D14.2, D13.1
2	Platform functions and form: the importance of weight and water depth; launched, self-floating and lift-installed jackets	8	D13.1, D14.1
3	Node design and fabrication; jacket fabrication, load-out and transportation; jacket configuration; topsides configuration governing load cases; in-plane design of jackets including ship impact and fatigue	8	A3.2, D20.1, A4.1
4	Concrete gravity structures for deep and shallow water applications and design issues	8,2	D20.1
5	Mid-term exam	8	A3.2, A4.1, D13.1, D14.1, D14.2
6	Floating platforms: tlps, semi-submersibles, fpsos, spars; riser types	8	A4.1
7	Novel and future types of platforms and their applicability	8	D20.1
8	Economic comparison between platform types, considering particular locations, environmental and reservoir characteristics.	2	D13.1, A4.1

Course: Offshore Technology	
Program LO’s	**Course LO’s**
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global,	A3.1 Recognize the applications of riser types, Soars necessary for semi-submersibles as well as for FPSOs.

cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.2 Use the international data to distinguish the advantages and disadvantages of different platform types.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1 Distinguish the environmental aspect and reservoir characteristics and locations of different platform types.
D13. Analyze geological data, interpret well-logs, estimate hydrocarbon reserves and evaluate reservoir performance by applying the principles and basic concepts of: geology, geophysics, and reservoir engineering.	D13.1 Assess economic comparisons between platform types, considering particular locations, environmental and reservoir characteristics.
D14. Plan and construct oil wells develop oilfield production programs, design early surface facilities plants and field evacuation plans by applying the principles and basic concepts of: drilling engineering, production engineering, phase equilibrium, fluid mechanics and flow through porous media.	D14.1 Define the importance of weight and water depth.
	D14.2 Design the launching sequence of offshore platforms.
D20. Create and/or re-design a process, component, or system, and carry out specialized engineering designs related to gas reservoir and well drilling and completion.	D20.1 Perform calculations of load-out and transportation of natural gas.

Course Coordinator: Eng. Hossam Mansour

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP604 (Natural Gas Engineering Production II)**		
Year/ Level	3rd level		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
8	Use the modern technologies and material safety data sheets in well completion design and design of different type of pumps.

3. Learning Outcomes (LO's):

A4.1	Design and analyze each type of artificial lift system using the API standard procedures
A4.2	Evaluate and troubleshoot the different artificial lift systems to sustain the producing well performance.
D1.1	Define different types of artificial systems including surface and downhole equipment, theory of operation and functions of each equipment.
D1.2	Recognize the different operations, control equipment, downhole equipment of well intervention operations includes both slickline and coiled tubing operation.
D1.3	Distinguish the production artificial lift system to identify the system problem and troubleshoot it.
D1.4	Recognize different applications which could be performed using coiled tubing and slickline to solve well downhole problems and issues.
D15.1	Analysis of production logging tools to identify each zone contribution and water source zone for further actions such as water shut off.
D15.2	Create a complete model using proper software, match PVT, construct IPR model, optimizing the well performance, selecting VLP correlation, design ALT systems and so on
D15.3	Create Modeling and analyzing of different problems of artificial lift system
D15.4	Accomplish applied practices and field cases include different artificial lift problems to diagnosis and analyze.

4. Course Contents:

No.	Topics	Week
1	Roles of production engineering in oil and gas fields management	1
2	Well completion design consideration and installation	2
3	Well completion equipment purposes and applications	3
4	Introduction to sucker rod system, main surface and downhole components	4
5	Sucker rod types, features and beam pumping failure types	5
6	Sucker rod pump design and diagnostic	6
7	Introduction to gas lift system, unloading and gas lift valve mechanics	7
8	Mid -Term Exam	8
9	Gas lift operation, optimization, troubleshooting and design	9
10	Introduction to Electrical submersible pumps and main surface and downhole components	10
11	Electrical submersible pump equipment theory of operation and performance	11
12	Electrical submersible pump design and troubleshooting	12
14	Introduction to jet pump, design and analysis	13
14	Introduction to coiled tubing and wireline equipment	14

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A4.1	X				X									
	A4.2	X	X				X								
D-Level	D1.1	X					X								
	D1.2	X					X								
	D1.3	X			X		X				X			X	
	A1.4	X					X							X	
	D15.1	X					X			X				X	

	D15.2	**X**			**X**		**X**				**X**			**X**	
	D15.3	**X**					**X**								
	D15.4	**X**					**X**								

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A4.1, A4.2, D1.3, D1.4, D1.1
2	Practical Examination	---
3	Oral Examination	D1.1,D1.2,D1.4
4	Formative (quizzes- online quizzes- presentation)	D1.1, D1.2, A4.1, D15.1, A1.1, D1.4
5	Final Term Examination (written)	D1.1, D1.2, A4.1, D15.1, A1.1

7.2 Assessment Schedule:

No.	**Assessment Method**	**Weeks**
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation – reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	**Assessment Method**	**Weights**
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100%

8. List of References:

No.	Reference List
1	Hernandez, A. Fundamentals of Gas Lift Engineering. Elsevier Gezondheidszorg (2016).
2	Mitra, N. K. Principles of Artificial Lift. Allied Publishers Pvt. Ltd (2016).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Roles of production engineering in oil and gas fields management	8	A4.1
2	Well completion design consideration and installation	8	A4.2
3	Well completion equipment purposes and applications	8	A4.2
4	Introduction to sucker rod system, main surface and downhole components	8	D1.3
5	Sucker rod types, features and beam pumping failure types	8	D1.4
6	Sucker rod pump design and diagnostic	8	D1.1
7	Introduction to gas lift system, unloading and gas lift valve mechanics	8	D1.2
8	Mid -Term Exam	8	A4.1, A4.2, D1.3, D1.4, D1.1
9	Gas lift operation, optimization, troubleshooting and design	8	D1.4
10	Introduction to Electrical submersible pumps and main surface and downhole components	8	D15.1
11	Electrical submersible pump equipment theory of operation and performance	8	D1.3
12	Electrical submersible pump design and troubleshooting	8	D1.2, D1.3
13	Introduction to jet pump, design and analysis	8	D1.2, D1.3
14	Introduction to coiled tubing and wireline	8	D1.4

	equipment		

Course: Natural Gas Production Engineering II	
Program LO’s	**Course LO’s**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1 Design and analyze each type of artificial lift system using the API standard procedures.
	A4.2 Evaluate and troubleshoot the different artificial lift systems to sustain the producing well performance.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Surveying, Measurements, and Mechanical and Electrical Design.	D1.1 Define different types of artificial systems including surface and downhole equipment, theory of operation and functions of each equipment.
	D1.2 Recognize the different operations, control equipment, downhole equipment of well intervention operations includes both slickline and coiled tubing operation.
	D1.3 Distinguish the production artificial lift system to identify the system problem and troubleshoot it.

	D1.4 Recognize different applications which could be performed using coiled tubing and slickline to solve well downhole problems and issues.
D15. "Use specialist computer applications and mathematical models to maximize the performance of all natural gas engineering stages ."	D15.1 Analyze the production logging tools to identify each zone contribution and water source zone for further actions such as water shut off.
	D15.2 Create a complete model using proper software, match PVT, construct IPR model, optimizing the well performance, selecting VLP correlation, design ALT systems and so on
	D15.3 Create Modeling and analyzing of different problems of artificial lift system.
	D15.4 Accomplish applied practices and field cases include different artificial lift problems to diagnosis and analyze.

Course Coordinator: Eng. Abdalla Darweesh

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP605 (Material aspect for Gas Production)**		
Year/ Level	3rd level		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
1	Apply a wide spectrum of engineering knowledge of phase diagram for alloy and types of corrosion and specialized skills with analytic, critical and systemic thinking to identify and solve corrosion problem in real life .

3. Learning Outcomes (LO's):

A4.1	Classify and define The Engineering materials.
A4.2	Identify elastic, plastic, and hardness, parameters of the materials.
A4.3	Identify conventional and advanced technology for refractory materials.
A4.4	Recognize the basic mechanism of corrosion, polarization, and methods of preventing corrosion according to applications.
A4.5	Choose relevant information from phase diagrams of alloy.
D1.1	Compare the different behaviors of engineering materials.
D1.2	Define the Intergranular corrosion, the Stress corrosion cracking.
D1.3	Identify and characterize the type of failure from different fracture surfaces.
D1.4	Use the metallographic lab equipment.
D12.1	Recognize the advanced engineering materials and their applications.
D12.2	Select the best materials and process for specific applications.
D12.3	Select the appropriate testing technique to evaluate the metallurgy properties of a material and its corrosion.
D12.4	Select the suitable test for certain applied load versus corrosion.
D12.5	Choose the suitable non-destructive testing techniques for industrial case study.

4. Course Contents:

No.	Topics	Week
1	Definition of course Specification- Engineering Materials	1-3
2	Material selection process for the gas industry - Production and limitation of material for piping, vessels, and other components	4-5
3	Introduction to electrochemical corrosion Aqueous corrosion - Uniform corrosion - Galvanic corrosion	6
4	Crevice corrosion - Pitting corrosion	7
5	Mid -Term Exam	8
6	Intergranular corrosion - Stress corrosion cracking	9-10
7	Dealloying - Application of all types of corrosion	11-12
8	Mechanical wear-Coating- Corrosion test	13-14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A4.1	X				X									
	A4.2	X	X				X								
	A4.3	X						X							
	A4.4							X							
	A4.5	X					X								
D-Level	D1.1	X													
	D1.2	X													
	D1.3	X			X		X				X				
	D1.4						X								
	D12.1	X					X								
	D12.2	X			X										
	D12.3	X					X								

	D12.4	**X**					**X**								
	D12.5	**X**					**X**				**X**				

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A4.1, D1.1, D12.1, D14.4, A4.4, D1.4
2	Practical Examination	---
3	Oral Examination	A4.1,A4.2,A4.3,A4.4,D1.1,D1.2,D1.3,D12.1
4	Formative (quizzes- online quizzes- presentation)	A4.1, D1.1, D12.1, D14.4, A4.4, D1.4, D1.2, A4.5
5	Final Term Examination (written)	A4.1, D1.1, D12.1, D14.4, A4.4, D1.4, D1.2, A4.5, D12.3, D12.4

7.2 Assessment Schedule:

No.	**Assessment Method**	**Weeks**
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	**Assessment Method**	**Weights**
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Javaherdashti, R., Nwaoha, C., & Tan, H. Corrosion and Materials in the Oil and Gas Industries (1st ed.). CRC Press. (2013).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Definition of course Specification- Engineering Materials	1	A4.1, A4.2, D1.1, D12.1
2	Material selection process for the gas industry - Production and limitation of material for piping, vessels, and other components	1	D12.1, D12.3, D14.4
3	Introduction to electrochemical corrosion Aqueous corrosion - Uniform corrosion - Galvanic corrosion	1	A4.4, A4.5, D1.2, D1.4
4	Crevice corrosion - Pitting corrosion	1	D1.2, D1.3, D1.4
5	Mid -Term Exam	1	A4.1, D1.1, D12.1, D14.4, A4.4, D1.4
6	Intergranular corrosion - Stress corrosion cracking	1	D12.2, D1.3
7	Dealloying - Application of all types of corrosion	1	D12.4, D1.4, A4.5
8	Mechanical wear-Coating- Corrosion test	1	A4.5, A4.4

Course: Material aspect for Gas Production	
Program LO's	**Course LO's**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1 Classify and define The Engineering materials .
	A4.2 Identify elastic, plastic, and hardness, parameters of the materials.
	A4.3 Identify conventional and advanced technology for refractory materials.
	A4.4 Recognize the basic mechanism of corrosion, polarization, and methods of preventing corrosion according to applications.
	A4.5 Choose relevant information from phase diagrams of alloy.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Surveying, Measurements, and Mechanical and Electrical Design.	D1.1 Compare the different behaviors of engineering materials.
	D1.2 Define the Intergranular corrosion, the Stress corrosion cracking.
	D1.3 Identify and characterize the type of failure from different fracture surfaces.
	D1.4 Use the metallographic lab equipment.

D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and Apply quality assurance procedures and follow codes and standards.	D12.1 Recognize the advanced engineering materials and their applications.
	D12.2 Select the best materials and process for specific applications.
	D12.3 Select the appropriate testing technique to evaluate the metallurgy properties of a material and its corrosion.
	D12.4 Select the suitable test for certain applied load versus corrosion.
	D12.5 Choose the suitable non-destructive testing techniques for industrial case study.

Course Coordinator: Dr. Abd Elnaser

Program Coordinator: Prof .Dr. Mohamed Bassyouni

Approval Date: 28/3/2021

1. Basic Information

Program Title	B. Sc. in natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	NGEP		
Course Code	HUM 391 / **Environment and society services**		
Year / Level / Semester	Third Year (Senior I)		
Prerequisite	None		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

2. Course aims:

No.	**aim**
2	Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles with the training schemes for small trades and their marketing, infrastructure project development.

3. Learning Outcomes (LOs):

A4.1	Conduct Legal and Regulation Considerations of Protection of The Environment
A7.1	work in stressful environment and within constraints within a team for class project and assignments
A9.1.	Work independently and within a team for class project and assignments.

4. Course Contents:

No.	**Topics**	**Week**
1	**Lectures** • Introduction about Community Development	**1-2**
2	**Lectures** • Plan and Purpose of Community Service and Development.	**3**
3	**Lectures** • Training Schemes for Small Trades and Their Marketing, Infrastructure Project Development	**4-5**
4	**Lectures** • Methods of Development of Small Projects	**5**
5	**Lectures** • Environmental Development: Evaluation of Environmental Impact of Projects	**6**
6	**Lectures** • Role of Universities in Dealing with Environmental Problems	**7**
7	**Lectures**	**8**

	• The development of The Environment. The development of The Environment. Nutrition and Pollution.	
8	• **Midterm**	**9**
9	**Lectures** • Their Relation to the development of the environment	**10-12**
10	**Lectures** • Legal and Regulation Considerations of Protection of The Environment.	**13-14**

5. Teaching and Learning Methods:

LO’s		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A4.1	**x**			**x**	**x**			**x**				**x**			
	A7.1	**x**			**x**			**x**								
	A9.1	**x**			**x**			**x**								

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online/Offline lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A4.1, A7.1, A9.1
2	Project	A4.1, A7.1, A9.1
3	Formative (quizzes- online quizzes- presentation.)	A4.1, A7.1, A9.1
4	Final Term Examination (written)	A4.1, A7.1, A9.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Project	15
3	Formative (quizzes- online quizzes- presentation.)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Project	15
3	Formative (quizzes- online quizzes- presentation.)	15
4	Final Term Examination (written)	50
Total		100%

8. List of References

No.	Reference List
1	Introduction to Environmental Modeling textbook Gray, William G. Gray, Genetha A. Published: December 2001.
2	The Environment and International Relations textbook O'Neill, Kate Published: February 2017 2nd Edition.
3	Environmental Capital: Government's Role in Protecting Ecosystem Services and Biodiversity (Environmental Science, Engineering and Technology), 2012
4	Maria Damon and Dale Jamieson, “Environment and Society, A Reader”, NYU Press, 2017.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures** - Introduction about Community Development	**2**	A4.1, A7.1, A9.1
2	**Lectures** - Plan and Purpose of Community Service and Development.	**2**	A4.1, A7.1, A9.1
3	**Lectures** - Training Schemes for Small Trades and Their Marketing, Infrastructure Project Development	**2**	A4.1, A7.1, A9.1
4	**Lectures** - Methods of Development of Small Projects	**2**	A4.1, A7.1, A9.1
5	**Lectures** - Environmental Development: Evaluation of Environmental Impact of Projects	**2**	A4.1, A7.1, A9.1
6	**Lectures** - Role of Universities in Dealing with Environmental Problems	**2**	A4.1, A7.1, A9.1
7	**Lectures** - The development of The Environment. The development of The Environment. Nutrition and Pollution.	**2**	A4.1, A7.1, A9.1
9	**Midterm**	**2**	A4.1, A7.1, A9.1
10	**Lectures** - Their Relation to The Development of The environment	**2**	A4.1, A7.1, A9.1
11	**Lectures** - Legal and Regulation Considerations of Protection of The Environment.	**2**	A4.1, A7.1, A9.1

Course: "Environment and society services- HUM391"	
Program LOs	**Course Los**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	**A4.1** Conduct Legal and Regulation Considerations of Protection of The Environment
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	**A7.1** work in stressful environment and within constraints within a team for class project and assignments
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	**A9.1** Work independently and within a team for class project and assignments.

Course Coordinator: Dr. /Mohamed Eltarabily

1. Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">B. Sc. in natural Gas Engineering</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Chemical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">NGEP</td></tr>
<tr><td>Course Code</td><td colspan="3">HUM 392 Management Science I</td></tr>
<tr><td>Year / Level / Semester</td><td colspan="3">Third Year (Senior I)</td></tr>
<tr><td>Prerequisite</td><td colspan="3">None</td></tr>
<tr><td>Specialization</td><td colspan="3">Minor</td></tr>
<tr><td rowspan="2">Teaching Hours / Bylaw 2012</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>-</td><td>-</td></tr>
</table>

2. Course aims:

No.	aim
5	Master self-learning and life -long learning strategies to communicate effectively using management science principals.
9	Lead, manage, and supervise a group to manage tasks, time, and resources in effective way.

3. Learning Outcomes (LOs):

A5.1	Describe what management is, what managers do, and how managers utilize organizational resources efficiently and to effectively achieve organizational goals.
A7.1	Analyze the importance of social responsibility and ethics on marketing.
A8.1	Distinguish among the four principal managerial tasks and how managers' ability to handle each one affects organizational performance.
D5.1	Ability to apply knowledge and skills to real-world experiences in an internship.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • An Overview of management.	**1**
2	**Lectures:** • Essential managerial tasks.	**2**
3	**Lectures:** • Levels and skills of managers.	**3-4**
4	**Lectures:** • Recent changes in management practices.	**5**
5	**Lectures:** • Levels and types of planning.	**6**
6	**Lectures:** • SWOT analysis and determining the organization's mission and goals.	**7**
7	**Lectures:** Organizational Structure	**8**

8	**Midterm**	**9**
9	**Lectures:** • Organizational Design	**10**
10	**Lectures:** • Leaders and Leadership	**11**
11	**Lectures:** • Foundations of Control	**12**
12	**Lectures:** • The Control Process	**13**
13	**Lectures:** • Steps in the decision-making process • Programmed and non-programmed decision making.	**14**

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A5.1	x			x	x			x				x			
	A7.1,	x			x	x		x					x			
	A8.1,	x			x	x		x	x			x	x			
D-Level	D5.1	x			x	x						x	x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online/Offline lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A5.1, A7.1, A8.1
2	Tutorial and Teamwork	A5.1, A7.1, A8.1, D5.1
3	Formative (quizzes- online quizzes- presentation)	A5.1, A7.1, A8.1, D5.1
4	Final Term Examination (written)	A5.1, A7.1, A8.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Project	15
3	Formative (quizzes- online quizzes- presentation)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Project	15
3	Formative (quizzes- online quizzes- presentation)	15
4	Final Term Examination (written)	50
Total		100%

8. List of References

No.	Reference List
1	David Anderson; Dennis J Sweeney; Thomas A Williams, An Introduction to Management Science, Mason, OH : Cengage, 2018.
2	Frederick S Hillier; Mark S Hillier; Karl Schmedders; Molly Stephens, Introduction to management science : a modeling and case studies approach with spreadsheets, New York, NY : McGraw-Hill Education, 2019
3	Jeffrey D. camm, & kipp Martin, An Introduction to Management Science, South-Western.
4	Bernard W Taylor, Introduction to management science, Harlow, United Kingdom : Pearson Education Limited, [2019]

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board

4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures:** - An Overview of management.	**5, 9**	A5.1, A7.1
2	**Lectures:** - Essential managerial tasks.	**5, 9**	A5.1, A7.1, A8.1,
3	**Lectures:** Levels and skills of managers.	**5, 9**	A5.1, A7.1, A8.1, D5.1
4	**Lectures:** - Recent changes in management practices.	**5, 9**	A7.1, A8.1
5	**Lectures:** - Levels and types of planning.	**5, 9**	A5.1, A7.1, A8.1, D5.1
6	**Lectures:** - SWOT analysis and determining the organization's mission and goals.	**5, 9**	A5.1, A7.1, A8.1, D5.1
7	**Lectures:** - Organizational Structure	**5, 9**	A5.1, A7.1, A8.1, D5.1
8	**Midterm**	**5, 9**	A5.1, A7.1, D5.1
9	**Lectures:** - Organizational Design	**5, 9**	A5.1, A7.1, D5.1
10	**Lectures:** - Leaders and Leadership	**5, 9**	A5.1, A7.1, A8.1, D5.1
11	**Lectures:** Foundations of Control	**5, 9**	A5.1, A7.1, A8.1
12	**Lectures:** The Control Process	**5, 9**	A5.1, A7.1, A8.1,
13	**Lectures:** - Steps in the decision-making process - Programmed and non-programmed decision making.	**5, 9**	A5.1, A7.1, A8.1, D5.1

Course: "Management Science I-HUM 392"	
Program LOs	**Course Los**
A5. Practice research techniques and methods of investigation as an inherent part of learning.	**A5.1** Describe what management is, what managers do, and how managers utilize organizational resources efficiently and to effectively achieve organizational goals.

A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	**A7.1** Analyze the importance of social responsibility and ethics on marketing.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	**A8.1** Distinguish among the four principal managerial tasks and how managers' ability to handle each one affects organizational performance.
D5. Demonstrate basic organizational and project management skills.	**D5.1** Ability to apply knowledge and skills to real-world experiences in an internship.

Course Coordinator: Dr Rabab Ragab

Program Coordinator: Prof. /Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information

Program Title	B. Sc. in natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	NGEP		
Course Code	**HUM 393 Engineering Ethics and Communication**		
Year / Level / Semester	Third Year (Senior I)		
Prerequisite	None		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

2. Course aims:

No.	**aim**
2	Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles.

3. Learning Outcomes (LOs):

A7-1	Learn how to manage time and resources effectively; for short-term and longer-term commitments.
A7-2	Think Logically; to identify ethical violations and how to resolve them
A8-1	Practice oral and written communication skills through class activities and group project
A8-2	Prepare Ethical analysis of case studies as a technical report in accordance with the standard scientific guidelines for given topics.
A8-3	Present reports discussing the results and defending his/her ideas to given Ethical situations though class activities and project.
A9-1	Demonstrate an understanding of the Engineering role in Society and the Ethical responsibilities of Engineer.
A9-2	Identify the difference between Engineering codes of honor, codes of practice, and codes of conduct
A9-3	Demonstrate and understanding of Engineering honor cannons, and ways of enforcing it.
A9-4	Analyze ethical dilemma engineering situations from all ethical aspects.

4. Course Contents:

No.	**Topics**	**Week**
1	• Introduction to engineering Ethics.	**1**
2	• Definitions and sources of Ethics.	**2**
3	• Engineering profession and Society.	**3**
4	• Code of Ethics, conduct, and practise.	**4-5**
5	• Engineering codes of Ethics	**6-7**
6	• Effective communication: Motivation	**8**
7	Midterm	**9**

8	• Effective communication: Writing well	**10-12**
9	• Effective communication: Oral communication	**13**
10	• Group projects presentation	**14**

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A7-1	x			x	x			x							
	A7-2	x			x	x			x							
	A8-1	x			x	x			x							
	A8-2	x			x	x			x							
	A8-3	x			x	x			x							
	A9-1	x			x	x			x							
	A9-2	x			x	x			x	x			x			
	A9-3	x			x	x			x	x			x			
	A9-4	x			x	x			x	x			x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online/Offline lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	In class activity and assignments	A7-1, A7-2, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3, A94
2	Group project presentation and discussion	A7-1, A7-2, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3, A94
3	Final Term Examination (written)	A7-1, A7-2, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3, A94

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Project	15
3	Formative (quizzes- online quizzes- presentation - …….)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Project	20
3	Formative (quizzes- online quizzes- presentation - …….)	10
4	Final Term Examination (written)	50
Total		100%

8. List of References

No.	Reference List
1	Periodicals, Web sites, etc • PROFESSIONAL RESPONSIBILITY: THE ROLE OF ENGINEERING IN SOCIETYS.P. Nichols and W.F. Weldon • Center for Electromechanics, The University of Texasat Austin, USA • NSF sponsored case studies • http://ethics.tamu.edu/pritchar/an-intro.htm
2	Herman T Tavani, Ethics and technology: ethical issues in an age of information and communication technology, Hoboken, NJ: Wiley, 2004.
3	James G Speight; Russell Foote, Ethics in science and engineering, Hoboken, N.J. : Wiley ; Salem, Mass. : Scrivener, ©2011.

9. Facilities Required for Teaching and Learning:

No.	Facility

1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	• Introduction to engineering Ethics.	**2**	A7-2, A8-2
2	• Definitions and sources of Ethics.	**2**	A7-2, A8-2
3	• Engineering profession and Society.	**2**	A7-2, A8-2, A9-1, A9-4
4	• Code of Ethics, conduct, and practise.	**2**	A7-2, A8-2, A9-2, A9-4
5	• Engineering codes of Ethics	**2**	A7-2, A8-2, A9-3, A9-4
6	• Effective communication: Motivation	**2**	A7-1, A8-1, A8-3
7	• Effective communication: Writing well	**2**	A7-1, A8-1, A8-3
8	• Effective communication: Oral communication	**2**	A7-1, A8-1, A8-3
9	• Group projects presentation	**2**	A7-1, A7-2, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3, A94

Course: "Engineering Ethics and Communication -HUM 393"	
Program LOs	**Course Los**
A7- Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	A7-1 Learn how to manage time and resources effectively; for short-term and longer-term commitments.
	A7-2 Think Logically; to identify ethical violations and how to resolve them
A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Practice oral and written communication skills through class activities and group project
	A8-2 Prepare Ethical analysis of case studies as a technical report in accordance with the standard scientific guidelines for given topics.
	A8-3 Present reports discussing the results and defending his/her ideas to given Ethical situations though class activities and project.
A9- Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9-1 Demonstrate an understanding of the Engineering role in Society and the Ethical responsibilities of Engineer.

	A9-2 Identify the difference between Engineering codes of honor, codes of practice, and codes of conduct
	A9-3 Demonstrate and understanding of Engineering honor cannons, and ways of enforcing it.
	A9-4 Analyze ethical dilemma engineering situations from all ethical aspects.

Course Coordinator: Dr. Rabab Abdel-Kader

Program Coordinator: Prof. /Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information

Program Title	B. Sc. in natural Gas Engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	NGEP		
Course Code	HUM 394 / **International Relations**		
Year / Level / Semester	Third Year (Senior I)		
Prerequisite	None		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

2. Course aims:

No.	aim
3	Work in and lead a heterogeneous team and display leadership qualities, and entrepreneurial skills for understanding International Economic Relations.

3. Learning Outcomes (LOs):

A7.1	Work within a team in order to Communicate effectively during project and assignments.
A8.1	Prepare and present International Relations movements' case studies as a technical report and presentation
A9.1.	Understand and evaluate the different techniques and strategies of the International Relations
A10.1.	Identify the difference between international economic relations

4. Course Contents:

No.	Topics	Week
1	**Lectures** • Definition of International Relations	**1-2**
2	**Lectures** • Framework of International Relations: Political Economic, Social, Legal, Military, Cultural, and Fine Arts.	**3**
3	**Lectures** • International Economic Relations: Movements of Goods id Services.	**4**
4	**Lectures** • International Economic Relations: Movements of International Labor, and Movements of Capital.	**5**
5	**Lectures** • International Economic Relations	**6**
6	**Lectures** • Direct and indirect Foreign Investments	**7**
7	**Lectures** • Short- and Long-Term Loans.	**8**
8	**Midterm**	**9**

9	**Lectures** - International Organizations.	**10-12**
10	**Lectures** - International Treaties.	**13-14**

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A7.1**	**x**			**x**	**x**			**x**				**x**			
	A8.1	**x**			**x**			**x**								
	A9.1	**x**			**x**			**x**								
	A10.1	**x**			**x**	**x**			**x**				**x**			

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online/Offline lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A7.1, A8.1, A9.1,A10.1
2	Project	A7.1, A8.1, A9.1,A10.1
3	Formative (quizzes- online quizzes- presentation - …….)	A7.1, A8.1, A9.1,A10.1
4	Final Term Examination (written)	A7.1, A8.1, A9.1,A10.1

7.2 Assessment Schedule:

No.	**Assessment Method**	**Weeks**
1	Mid Term Examination (written/ online)	9
2	Project	15

3	Formative (quizzes- online quizzes-presentation - …….)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Project	20
3	Formative (quizzes- online quizzes-presentation - …….)	10
4	Final Term Examination (written)	50
Total		100%

8. List of References

No.	Reference List
1	International Relations – an E-IR Foundations beginner's textbook. Edited by Stephen McGlinchey, 2007.
	Malcolm Tight; International relations, Amsterdam; Oxford, Elsevier JAI, 2005.
	Scott Burchill; Theories of international relations, Houndmills, Basingstoke, Hampshire; New York: Palgrave Macmillan, 2009.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures** • Definition of International Relations	**3**	A71, A8.1, A9.1,A10.1
2	**Lectures** • Framework of International Relations: Political Economic, Social, Legal, Military, Cultural, and Fine Arts.	**3**	A71, A8.1, A9.1,A10.1
3	**Lectures** • International Economic Relations: Movements of Goods id Services.	**3**	A71, A8.1, A9.1,A10.1
4	**Lectures** • International Economic Relations: Movements of International Labor, and Movements of Capital.	**3**	A71, A8.1, A9.1,A10.1
5	**Lectures** • International Economic Relations	**3**	A71, A8.1, A9.1,A10.1

6	**Lectures** - Direct and indirect Foreign Investments	**3**	A71, A8.1, A9.1,A10.1
7	**Lectures** - Short- and Long-Term Loans.	**3**	A71, A8.1, A9.1,A10.1
8	**Midterm**	**3**	A71, A8.1, A9.1,A10.1
9	**Lectures** - International Organizations.	**3**	A71, A8.1, A9.1,A10.1
10	**Lectures** - International Treaties.	**3**	A71, A8.1, A9.1,A10.1

Course: "Engineering Ethics and Communication -HUM 393"	
Program LOs	**Course Los**
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams. **A8.** Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	**A7.1** Work within a team in order to Communicate effectively during project and assignments. A8.1 Prepare and present International Relations movements' case studies as a technical report and presentation.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	**A9.1** Understand and evaluate the different techniques and strategies of the International Relations.
A10. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	**A10.1** Identify the difference between international economic relations

Course Coordinator: Dr. Rabab Abdel-Kader

Program Coordinator: Prof. /Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Mechanical Engineering Department		
Course Code	**NGP411/ Fuel Science and Technology**		
Year/ Level	4th level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	3	2	0

2. Course aims:

No.	Aim
1	Apply fuel combustion, science technology and specialized skills with analytic, critical and systemic thinking to identify and solve fuel combustion problems.
2	Behave professionally and adhere to engineering ethics and environmental standards to recognize the environmental effect of fuel combustion.

3. Learning Outcomes (LO's):

A3.1	Solve fuel combustion problems, demand of the fuel and fuel economic considerations.
A3.2	Identify environmental, safety and economic problems.
A3.3	Select, analyze, and solve engineering problems to determine the optimum fuel.
A5.1	Investigate the different engineering problems in fuel combustion, properties, consumption, demand, and economic problems.
D1.1	Recognize the fuel classifications, combustion, and technology.
D16.1	Use linked thinking in the application of ecological, efficiency, safety, and economic considerations.

4. Course Contents:

No.	Topics	Week
1	Classification of fuels. Origin, geology, production and processing of fossil fuels.	1-3
2	Physical and chemical properties and influence on fuel utilization.	4-5
3	Thermodynamics and reaction kinetics of combustion.	6-7
4	Mid -Term Exam	8
5	Supply, consumption, and demand for fuels - historical patterns and future trends.	9-10

6	Ecological, efficiency, safety, economic considerations.	11-12
7	Non-conventional fuels. Transportation and handling.	13-14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A3.1	**X**				**X**									
	A3.2	**X**	**X**				**X**				**X**				
	A3.3	**X**													
	A5.1	**X**			**X**			**X**			**X**				
D-Level	D1.1	**X**			**X**		**X**								
	D16.1	**X**					**X**	**X**							

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	D1.1, A3.1, A3.3, A5.1
2	Practical Examination	---
3	Oral Examination	A5.1,D1.1
4	Formative (quizzes- online quizzes- presentation)	D1.1, A3.1, A3.3, A5.1, A3.2, A3.3, D16.1

5	Final Term Examination (written)	D1.1, A3.1, A3.3, A5.1, A3.2, A3.3, D16.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Jr., C. B. E. The John Zink Hamworthy Combustion Handbook: Volume 3 - Applications (Industrial Combustion) (2nd ed.). CRC Press (2013).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Classification of fuels. Origin, geology, production, and processing of fossil fuels.	1	D1.1, D16.1, A3.1
2	Physical and chemical properties and influence on fuel utilization.	1	D1.1, A5.1, A3.3
3	Thermodynamics and reaction kinetics of combustion.	1	A3.1, D1.1
4	Mid -Term Exam	1	D1.1, A3.1, A3.3, A5.1
5	Supply, consumption and demand for fuels - historical patterns and future trends.	2	A3.2, A3.1, D1.1
6	Ecological, efficiency, safety, economic considerations.	2	A3.2, A3.3, D16.1
7	Non-conventional fuels. Transportation and handling.	1	A5.1, D1.1

Course: Fuel Science and Technology	
Program LO’s	**Course LO’s**
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental، ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.1 Solve fuel combustion problems, demand of the fuel and fuel economic considerations.
	A3.2 Identify environmental, safety and economic problems.
	A3.3 Select, analyze, and solve engineering problems to determine the optimum fuel.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Investigate the different engineering problems in fuel combustion, properties, consumption, demand, and economic problems.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Surveying, Measurements, and Mechanical and Electrical Design.	D1.1 Recognize the fuel classifications, combustion, and technology.

D16. Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer .	D16.1 Use linked thinking in the application of ecological, efficiency, safety, and economic considerations.

Course Coordinator: Dr. Hamada Mohamed Gad
Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Mechanical Engineering Department		
Course Code	**NGP412/ Natural Gas Transmission**		
Year/ Level	4th level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	3	2	-

2. Course aims:

No.	Aim
8	Use the modern technologies and piping material data sheets while designing and handling natural gas projects
9	Manage a group of process and operational engineers, and apply common practice in natural gas transmission to meet society's requirements of occupational health, safety, and quality standards

3. Learning Outcomes (LO’s):

A3.1	Solve the design problems of the natural gas pipeline.
A3.2	Discuss the different engineering equipment used in natural gas transmission.
A3.3	Design the pipeline route.
A4.1	Determine engineering principles in the fields of energy, natural gas process engineering, natural gas engineering applications.
A4.2	Recognize the different natural gas transmission techniques and flow measurements.
A4.3	Investigate engineering principles, theories and methods in NG flow and transmission,
D10.1	Use linked thinking in the application of ecological, efficiency, safety and economic considerations
D12.1	Assess professional designs for different engineering applications.
D16.1	Relate Natural Gas Pipeline Operation and Maintenance
D16.2	Define the necessity of natural gas transmission.

4. Course Contents:

No.	Topics	Week
1	Introduction to natural gas engineering	1
2	Natural Gas Volumetric Measurements and metering systems	2-3
3	Natural Gas Transportation Techniques	4
4	Raw and Sales Gas Transmission	5-7
5	Mid -Term Exam	8

6	Natural Gas Pipelines (Types, Components, Design, tie ins	9-10
7	Natural Gas Pipeline Operation and Maintenance	11-12
8	Pipeline, Route selection and shore approach sections.	13-14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A3.1	**X**				**X**									
	A3.2	**X**	**X**				**X**				**X**				
	A3.3	**X**									**X**				
	A4.1	**X**			**X**										
	A4.2	**X**			**X**		**X**								
	A4.3	**X**					**X**								
D-Level	D10.1	**X**						**X**			**X**				
	D12.1	**X**						**X**							
	D16.1	**X**													

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A4.1, A4.2, D12.1, D16.2, A3.2, A4.3
2	Practical Examination	---
3	Oral Examination	A3.2,A4.1,A4.2,A4.3,D16.2
4	Formative (quizzes- online quizzes- presentation)	A4.1, A4.2, D16.2, A3.2, A4.3, A3.1, A3.3, D16.1
5	Final Term Examination (written)	A4.1, A4.2, D12.1, D16.2, A3.2, A4.3, A3.1, A3.3, D10.1, D16.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Mokhatab, S., Poe, W. A., & Mak, J. Y. Handbook of Natural Gas Transmission and Processing. Elsevier Gezondheidszorg. (2015).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board

4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction to natural gas engineering	8	A4.1, A4.2, A4.3
2	Natural Gas Volumetric Measurements and metering systems	8	A3.2, D16.2
3	Natural Gas Transportation Techniques	9	A3.1, D10.1, A4.2
4	Raw and Sales Gas Transmission	8	A4.2, D12.1
5	Mid -Term Exam	8 / 9	A4.1, A4.2, D12.1, D16.2, A3.2, A4.3
6	Natural Gas Pipelines (Types, Components, Design, tie ins	8	D16.1, D16.2, D10.1, A4.3
7	Natural Gas Pipeline Operation and Maintenance	9	D16.1, A3.3, A4.3
8	Pipeline, Route selection and shore approach sections.	9	A3.1, D10.1, D12.1

Course: Natural Gas Transmission

Program LO's	Course LO's
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental، ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.1 Solve the design problems of the natural gas pipeline.
	A3.2 Discuss the different engineering equipments used in natural gas transmission.
	A3.3 Design the pipeline route.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements,	A4.1 Determine engineering principles in the fields of energy, natural gas process engineering, natural gas engineering applications.

environmental issues, and risk management principles.	A4.2 Recognize the different natural gas transmission techniques and flow measurements.
	A4.3 Investigate engineering principles, theories and methods in NG flow and transmission.
D10. Incorporate economic, societal, environmental dimensions and risk management in design.	D10.1 Use linked thinking in the application of ecological, efficiency, safety, and economic considerations
D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and Apply quality assurance procedures and follow codes and standards.	D12.1 Assess professional designs for different engineering applications.
D16. Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer .	D16.1 Relate Natural Gas Pipeline Operation and Maintenance.
	D16.2 Define the necessity of natural gas transmission.

Course Coordinator: Dr. Mohamed Soliman

Program Coordinator: Prof. Dr. Mohamed Bassyouni
Approval Date: 28 / 3 / 2021

1. Basic Information:

<table>
<tr><td>Program Title</td><td colspan="3">NGEP</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Chemical Engineering Department</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Mechanical Engineering Department</td></tr>
<tr><td>Course Code</td><td colspan="3">NGP421(Natural Gas Pipeline Networks)</td></tr>
<tr><td>Year/ Level</td><td colspan="3">4th level</td></tr>
<tr><td>Specialization</td><td colspan="3">Major</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>3</td><td>2</td><td>-</td></tr>
</table>

2. Course aims:

No.	Aim
8	Use the modern technologies and material safety data sheets while designing and handling natural gas projects and how they can be used for natural gas transportation and distribution.

3. Learning Outcomes (LO's):

A4.1	State pipeline components, classifications, and advantages.
A4.2	Define the real gas and state its properties.
A4.3	Define the compressibility factor and state the methods used to calculate it.
A4.4	Show the flow equations used to calculate the flow rate in a pipeline.
A4.5	Define the optimum compressor location.
A4.6	Describe the Hardy Cross method.
D1.1	Design the pipeline network.
D1.2	Use the piping system type to identify the flow rate and pressure drop.
D11.1	Apply the energy equation on the pipeline flow problems.
D11.2	Evaluate the flow rate in a network using Hardy Cross method.
D11.3	Calculate the compressibility factor by different methods.
D11.5	Distinguish between the series and parallel piping.
D11.6	Determine the optimum compressor locations.
D12.1	Work in groups to make reports about the different types of pipelines.
D12.2	Evaluate the pressure drop in a pipeline.

4. Course Contents:

No.	Topics	Week
1	Introduction, pipeline classifications and components. Ideal gases, Real gases, and natural gas mixtures.	1-3
2	Flow equations, pressure drop due to friction, and pressure required to transport.	4-5

3	Series piping, and Parallel piping,	6
4	Locating pipe loop, and Hydraulic Pressure Gradient Line and Temperature Variation and Gas Pipeline Modeling.	7
5	Mid -Term Exam	8
6	Compressor Stations.	9-10
7	Compressors in Series and Parallel, and Compressor Station Piping Losses	11-12
8	Design of Pipeline Networks	13-14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A4.1	**X**				**X**									
	A4.2	**X**	**X**				**X**								
	A4.3	**X**						**X**			**X**				
	A4.4	**X**						**X**							
	A4.5	**X**					**X**								
	A4.6	**X**			**X**		**X**								
D-Level	D1.1	**X**					**X**								
	D1.2	**X**					**X**								
	D11.1	**X**			**X**		**X**				**X**				
	D11.2	**X**					**X**								
	D11.3	**X**					**X**								
	D11.4	**X**			**X**		**X**				**X**				
	D11.5	**X**					**X**								
	D11.6	**X**					**X**								
	D12.1	**X**					**X**				**X**				
	D12.2	**X**													

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A4.1, A4.2, A4.3, D1.1, D1.2, D11.1
2	Practical Examination	---
3	Oral Examination	A4.1,A4.2,A4.3,A4.5,A4.6,D11.5
4	Formative (quizzes- online quizzes-presentation)	A4.4, A4.3, D1.2, D11.3
5	Final Term Examination (written)	A4.1, A4.2, A4.3, D1.1, D1.2, D11.1, D11.4, D11.3, A4.6

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes-presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Bahadori, A. Oil and Gas Pipelines and Piping Systems: Design, Construction, Management, and Inspection (1st ed.). Gulf Professional Publishing (2016).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction, pipeline classifications and components. Ideal gases, Real gases and natural gas mixtures.	8	A4.1, A4.2, A4.3
2	Flow equations, pressure drop due to friction, and pressure required to transport.	8	D11.1, D11.2, D11.3, D11.4
3	Series piping, and Parallel piping,	8	A4.1, D1.1, D1.2
4	Locating pipe loop, and Hydraulic Pressure Gradient Line and Temperature Variation and Gas Pipeline Modeling.	8	A4.5, D11.1, D1.1, D1.2
5	Mid -Term Exam	8	A4.1, A4.2, A4.3, D1.1, D1.2, D11.1
6	Compressor Stations.	8	D11.2, D11.3, D11.4
7	Compressors in Series and Parallel, and Compressor Station Piping Losses	8	D1.1, D1.2, D11.4
8	Design of Pipeline Networks	8	D1.1, D1.2, D11.3, D11.4

Course: Natural Gas Pipeline network	
Program LO's	**Course LO's**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1 State pipeline components, classifications, and advantages.
	A4.2 Define the real gas and state its properties.
	A4.3 Define the compressibility factor and state the methods used to calculate it.
	A4.4 Show the flow equations used to calculate the flow rate in a pipeline.
	A4.5 Define the optimum compressor location.
	A4.6 Describe the Hardy Cross method.
D1. Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Surveying, Measurements, and Mechanical and Electrical Design.	D1.1 Design the pipeline network.
	D1.2 Use the piping system type to identify the flow rate and pressure drop.
D11. Practice the neatness and aesthetics in design and approach.	D11.1 Apply the energy equation on the pipeline flow problems.
	D11.2 Evaluate the flow rate in a network using Hardy Cross method.
	D11.3 Calculate the compressibility factor by different methods.
	D11.4 Determine the gas flow rate through a pipeline.
	D11.5 Distinguish between the series and parallel piping.

	D11.6 Determine the optimum compressor locations.
D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and Apply quality assurance procedures and follow codes and standards.	D12.1 Work in groups to make reports about the different types of pipelines.
	D12.2 Evaluate the pressure drop in a pipeline.

Course Coordinator: Dr. Mohamed Soliman

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28/3/2021

1. Basic Information

Program Title	B. Sc. in Natural gas engineering		
Department offering the Program	Chemical Engineering		
Department Responsible for the Course	NGEP		
Course Code	NGP 499 senior project		
Year/ Level	Fourth Year (Senior II) 1st semester & 2nd semester		
Specialization	Major		
Teaching Hours	**Lectures**	**Tutorial**	**Practical/Lab.**
	-	6 hours (1st term), 6 hours (2nd term)	-

2. Course aims:

No.	aim
3	Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.
5	Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages to deal with academic/professional challenges in a critical and creative manner.
7	Apply analytical, experimental, design, natural gas engineering processes with proficiency aided by modern engineering tools

3. Learning Outcomes (LOs):

A6.1	Use different resources such as textbooks, journals, and internet to develop new ideas in the project.
A7.1	Participate in a teamwork in the research work of the graduation project.
A8.1	Model a variety of engineering problems by selecting appropriate ICT tools.
A8.2	Share ideas and communicate with others according to the rules of the professional ethics.
A9.1	Complete certain tasks in a limited time frame.
A9.2	Critically analyze deferent aspects of the project at one time.
A9.3	Improve the individual presentation skills when explaining their own ideas.
A10.1	Search of new topics on the world wide web.
A10.2	Use computer-based and modern tools in natural gas engineering.
A10.3	Present ideas in the form of electronic presentation.
A10.4	Search for information about materials, methods, technologies, and new computer tools and software in natural gas engineering.
D2.1.	use the main surveying principles and topographical equipment in exploration activities
D4.1.	use software applications in designing natural gas processing plants and analyzing the model results
D5.1.	define the roles of each member in the working team and the assigned tasks with the time frame
D7.1.	apply the computational techniques and numerical models for main natural gas processes

D18.1.	propose revamping schemes for existing natural gas project after evaluation of performance and productivity
D19.1.	Interpret the data of well logs and well testing to be utilized for further drilling and production operations
D20.1.	design and/or retrofit of reservoir, drilling and completion projects
D22.1.	apply the basic engineering knowledge and the professional understanding to design natural gas processing facilities

4. Course Contents:

Topic No.	Topic	Weeks
1	**Labs/ Tutorials:** • Project introduction - Project introduction and groups' formation.	**1st semester/ w1** **2nd semester/ w1**
2	**Labs/ Tutorials:** • Research studies - Project research studies and program analysis	**1st semester/ w2** **2nd semester/ w2**
3	**Labs/ Tutorials:** • Project layout - Sketch design for the project's layout	**1st semester/ w3** **2nd semester/ w3**
4	**Labs/ Tutorials:** • Design of project elements - Design of various project parts and elements - Design of various project parts and elements - Review of design and redesign of various project parts and elements	**1st semester/ w4~7** **2nd semester/ w4~7**
5	**Labs/ Tutorials:** • Drawing of the details of project - Sketch the necessary block diagrams of the designed processes - Sketch the necessary process flow diagram of each process	**1st semester/ w8~11** **2nd semester/ w8~11**
6	**Labs/ Tutorials:** • Review and finishing of project. - Project final review - Final drawings and presentation of the project.	**1st semester/ w12~14** **2nd semester/ w12~14**

5. Teaching and Learning Methods:

	Teaching and Learning Method

		Face-to-Face Lecture	Online Lecture	Flipped Classroom	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Site visits	Self-learning and Research	Cooperative	Discovering	Modeling	Playing
A-Level	A6.1				x	x				x						
	A7.1				x	x				x						
	A8.1				x	x				x		x				
	A8.2					x				x	x	x				
	A9.1							x		x		x				
	A9.2				x	x		x	x	x						
	A9.3				x	x				x						
	A10.1							x		x		x				
	A10.2				x			x		x						
	A10.3				x	x				x						
	A10.4							x	x	x		x				
D-Level	**D2.1.**							x	x	x						
	D4.1.				x	x				x						
	D5.1.				x	x				x						
	D7.1.				x			x	x	x						
	D18.1.								x	x						
	D19.1.							x		x		x				
	D20.1.									x		x				
	D22.1.									x			x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Monitoring	A6.1, A7.1, A8.1, A8.2، A9.1، A9.2, A9.3, A10.1, A10.2, A10.3, A10.4, D2.1., D4.1., D5.1., D7.1., D18.1., D19.1., D20.1., D22.1.
2	Project assessment	A6.1, A7.1, A8.1, A8.2، A9.1، A9.2, A9.3, A10.1, A10.2, A10.3, A10.4, D2.1., D4.1., D5.1., D7.1., D18.1., D19.1., D20.1., D22.1.
3	Presentation assessment	A6.1, A7.1, A8.1, A8.2، A9.1، A9.2, A9.3, A10.1, A10.2, A10.3, A10.4, D2.1., D4.1., D5.1., D7.1., D18.1., D19.1., D20.1., D22.1.
4	Oral exam	A6.1, A7.1, A8.1, A8.2، A9.1، A9.2, A9.3, A10.1, A10.2, A10.3, A10.4, D2.1., D4.1., D5.1., D7.1., D18.1., D19.1., D20.1., D22.1.

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Monitoring	weakly
2	Project assessment	15
3	Presentation assessment	15
4	Oral exam	15

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Monitoring	25
2	Project assessment	25
3	Presentation assessment	25
4	Oral exam	25
Total		100%

8. List of References

Course Notes	▪ None
Essential Books (Textbooks)	Depend upon the project
Recommended books	▪ Depend upon the project
Periodicals, Web sites, etc	▪ Depend upon the project

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lab Facilities
2	Data Show System
3	Presenter

10. Matrix of Knowledge and Skills of the Course:

Topic No.	Topic	Aim	Course LOs Covered (By No.)
1	**Labs/ Tutorials:** • Project introduction - Project introduction and groups' formation.	**3,5,7**	A7.1, D5.1
2	**Labs/ Tutorials:** • Research studies - Project research studies and program analysis	**3,5,7**	A6.1, A10.1, A10.2, A10.3,
3	**Labs/ Tutorials:** • Project layout - Sketch design for the project's layout	**3,5,7**	A8.1, A9.1, A9.2, D5.1
4	**Labs/ Tutorials:** • Design of project elements - Design of various project parts and elements - Design of various project parts and elements - Review of design and redesign of various project parts and elements	**3,5,7**	A7.1, A8.1, A9.1, A9.2, A10.2, D4.1., D5.1., D7.1., D18.1., D19.1 D22.1,
5	**Labs/ Tutorials:** • Drawing of the details of project - Sketch the necessary block diagrams of the designed processes	**3,5,7**	A9.1, A9.2, D4.1.,

	- Sketch the necessary process flow diagram of each process		
6	**Labs/ Tutorials:** - Review and finishing of project. - Project final review - Final drawings and presentation of the project.	**3,5,7**	A9.1, A9.2, A9.3, A10.3, D20.1,

Course: Project	
Programme LOs **The graduates of the program should be able to**	**Course LOs**
A6 Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Use different resources such as textbooks, journals, and internet to develop new ideas in the project.
A7 Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural team.	A7.1 Participate in a teamwork in the research work of the graduation project.
A8 Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8.1 Model a variety of engineering problems by selecting appropriate ICT tools.
	A8.2 Share ideas and communicate with others according to the rules of the professional ethics.
A9 Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9.1 Complete certain tasks in a limited time frame.
	A9.2 Critically analyze deferent aspects of the project at one time.
	A9.3 Improve the individual presentation skills when explaining their own ideas.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Search of new topics on the world wide web.
	A10.2 Use computer-based and modern tools in natural gas engineering.
	A10.3 Present ideas in the form of electronic presentation.
	A10.4 Search for information about materials, methods, technologies, and new computer tools and software in civil engineering.
D2. Demonstrate knowledge, understanding, and utilization of plane and topographical surveying techniques, processes and equipment, photogrammetry and the Global Positioning system (GPS) in engineering projects.	D2.1. use the main surveying principles and topographical equipment in exploration activities

D4. Demonstrate additional abilities to select appropriate system, analyze, and design using the most up-to-date analytical tools, techniques, equipment, and software packages .	D4.1. use software applications in designing natural gas processing plants and analyzing the model results
D5. Demonstrate basic organizational and project management skills.	D5.1. define the roles of each member in the working team and the assigned tasks with the time frame
D7. Apply numerical modeling methods and/or computational techniques.	D7.1. apply the computational techniques and numerical models for main natural gas processes
D18. Evaluate and appraise designs, processes (operations), equipment and machinery, and propose improvements.	D18.1. propose revamping schemes for existing natural gas project after evaluation of performance and productivity
D19. Analyze and interpret data related to well logs and testing, and design experiments to obtain new data.	D19.1. Interpret the data of well logs and well testing to be utilized for further drilling and production operations
D20. Create and/or re-design a process, component or system, and carry out specialized engineering designs related to gas reservoir and well drilling and completion.	D20.1. design and/or retrofit of reservoir, drilling and completion projects
D22. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services in natural gas processing and applications.	D22.1. apply the basic engineering knowledge and the professional understanding to design natural gas processing facilities

Program Coordinator: Assoc. Prof. /Mohamed bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP701 (Well Testing)**		
Year/ Level	4th level		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
7	Apply analytical, experimental well tests with proficiency aided by modern engineering tools.

3. Learning Outcomes (LO's):

A2.1	Create tests, Injection and falloff tests, Interference, and communication tests.
A2.2	Discuss the pressure types, overburden, fluid, and effective pressures.
A2.3	Determine Gas/Oil and Oil/Water contacts from RFT.
D3.1	Recognize Reservoir petrophysical parameters.
D3.2	Define Drilling hydrocarbon wells and borehole environment, The effect of drilling mud on pressures.
D3.3	Define well logging, Wireline formation testing, RFT, RFS and FMT. RFT tool design, principles, and operation.
D3.4	List Principles and objectives of well testing. Well testing steps.
D9.1	Discuss the Case studies on; Drawdown and buildup tests, Injection and falloff tests, Interference, and communication tests.
D9.2	Evaluate pressures and petrophysical parameters, Determination Gas/Oil and Oil/Water contacts.
D12.1	Evaluate RFT pressure log, RFT log interpretation, flow rate and permeability.
D12.2	Work in stressful environment and within constraints.

4. Course Contents:

No.	Topics	Week
1	Reservoir petrophysical parameters.	1
2	Drilling hydrocarbon wells and borehole environment.	2
3	Define well logging.	3
4	Principles and objectives of well testing. Well testing steps.	4

5	Drawdown and buildup tests, case studies	5
6	Injection and falloff tests, case studies.	6
7	Interference and communication tests, case studies.	7
8	Mid -Term Exam	8
9	Discussion about pressure types, overburden, fluid and effective pressures. The effect of drilling mud on pressures.	9
10	Calculation of overburden, pore, and fracture pressures from well logs, and their importance.	10
11	Wireline formation testing, RFT, RFS and FMT. RFT tool design, principles, and operation.	11
12	RFT pressure log, RFT log interpretation, flow rate and permeability calculation.	12
13	Determination Gas/Oil and Oil/Water contacts from RFT.	13-14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A2.1	X				X									
	A2.2	X	X				X								
	A2.3	X						X							
D-Level	D3.1	X													
	D3.2	X												X	
	D3.3	X			X		X				X				
	D3.4						X							X	
	D9.1	X					X							X	
	D9.2	X			X										
	D12.1	X					X								
	D12.2	X					X							X	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A2.1, D3.1, D3.2, D3.3, D3.4, D9.1
2	Practical Examination	---
3	Oral Examination	A2.2,A2.3,D3.1,D3.2,D3.3,D3.4,D9.1
4	Formative (quizzes- online quizzes-presentation)	D3.3, D9.2, D12.1, D3.1
5	Final Term Examination (written)	D3.1, D3.2, D3.3, D3.4, D9.1, A2.3, D9.2, D12.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes-presentation –report)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Spivey, J. P., Lee, W. J., Engineers, S. O. P., & Society of Petroleum Engineers (U.S.). Applied Well Test Interpretation (2013).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Reservoir petrophysical parameters.	7	D3.1
2	Drilling hydrocarbon wells and borehole environment.	7	D3.2
3	Define well logging.	7	D3.3
4	Principles and objectives of well testing. Well testing steps.	7	D3.4
5	Drawdown and buildup tests, case studies	7	D9.1, A2.1
6	Injection and falloff tests, case studies.	7	D9.1, A2.1
7	Interference and communication tests, case studies.	7	A2.1, D9.1
8	Mid -Term Exam	7	A2.1, D3.1, D3.2, D3.3, D3.4, D9.1
9	Discussion about pressure types, overburden, fluid and effective pressures. The effect of drilling mud on pressures.	7	D9.1
10	Calculation of overburden, pore and fracture pressures from well logs, and their importance.	7	A2.2, D12.2
11	Wireline formation testing, RFT, RFS and FMT. RFT tool design, principles and operation.	7	D3.3, D12.1
12	RFT pressure log, RFT log interpretation, flow rate and permeability calculation.	7	D3.3, D12.1
13	Determination Gas/Oil and Oil/Water contacts from RFT.	7	D9.2, A2.3

Course: Natural Gas Well Testing	
Program LO’s	**Course LO’s**

A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Create tests, Injection and falloff tests, Interference, and communication tests.
	A2.2 Discuss the pressure types, overburden, fluid, and effective pressures.
	A2.3 Determine Gas/Oil and Oil/Water contacts from RFT.
D3. Use computational facilities and techniques, measuring instruments, workshops, and laboratory equipment to design experiments, collect, analyze and interpret results.	D3.1 Recognize Reservoir petrophysical parameters.
	D3.2 Define Drilling hydrocarbon wells and borehole environment, The effect of drilling mud on pressures.
	D3.3 Define well logging, Wireline formation testing, RFT, RFS and FMT. RFT tool design, principles, and operation.
	D3.4 List Principles and objectives of well testing, Well testing steps.
D9. Exchange knowledge and skills with engineering community and industry.	D9.1 Discuss the Case studies on; Drawdown and buildup tests, Injection and falloff tests, Interference, and communication tests.
	D9.2 Evaluate pressures and petrophysical parameters, Determination Gas/Oil and Oil/Water contacts.
D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and Apply quality assurance procedures and follow codes and standards.	D12.1 Evaluate RFT pressure log, RFT log interpretation, flow rate and permeability.
	D12.2 Work in stressful environment and within constraints.

Course Coordinator: Prof. Dr. Muhammad Nabih

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Approval Date: 28/3/2021

1. Basic Information:

<table>
<tr><td>Program Title</td><td colspan="3">NGEP</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Chemical Engineering Department</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Chemical Engineering Department</td></tr>
<tr><td>Course Code</td><td colspan="3">NGP702 (Gas Process simulation)</td></tr>
<tr><td>Year/ Level</td><td colspan="3">4th level</td></tr>
<tr><td>Specialization</td><td colspan="3">Minor</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>2</td><td>-</td></tr>
</table>

2. Course aims:

No.	Aim
7	Apply design and simulation of natural gas engineering processes by using Aspen Hysys, Excel and MATLAB.
6	Act professionally in design and supervision of natural gas processes.

3. Learning Outcomes (LO's):

A2.1	Use Aspen Hysys to simulate processes and analyze results of equipment sizing and operating/design variables.
A2.2	Apply MATLAB program whenever needed to solve models.
D3.1	Use Excel spreadsheet for engineering problems solving of differential equations/algebraic equations.
D3.2	Analyze results of process simulations and excel tool to understand performance of chemical reactors with set of reactions.
D7.1	Investigate conservation of mass, energy, and momentum conceptually.
D7.2	Investigate principles of chemical reaction equilibrium and thermodynamics, mass and energy balance, transport processes, separation processes, and process control.
D7.3	Practice designing principles related to specific to cases of separation sequences, reaction systems, exchangers, etc.
D7.4	Create various mathematical models for applications with various degrees of assumptions.

D15.1	Select Excel/Hysys to solve mathematical models build for chemical engineering applications.
D21.1	Apply conservation laws of mass and energy to chemical processes and differential equation techniques for problem solutions.

4. Course Contents:

No.	Topics	Week
1	Excel spreadsheet and MATLAB. Fundamental of process simulation using rigorous simulation packages	1-3
2	Aspen-Hysys computer simulations: streams, reaction kinetics, reactors, separation processes, exchangers, pumps/compressors/heat exchanger networks, flash drums, absorbers, plug flow reactors	4-7
3	Mid-Term	
4	Aspen-Hysys computer simulations: streams, reaction kinetics, reactors, separation processes, exchangers, pumps/compressors/heat exchanger networks, flash drums, absorbers, plug flow reactors	8-9
5	Case studies/project and applications/oral presentations	10-14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A2.1	X				X									
	A2.2	X	X				X								
D-Level	D3.1	X													
	D3.2	X												X	
	D7.1	X			X		X				X				
	D7.2						X							X	
	D7.3	X					X							X	
	D7.4	X			X										
	D15.1	X					X								

	D21.1	**X**					**X**							**X**	

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A2.2, D3.1, D3.2, D7.2, D7.3
2	Practical Examination	---
3	Oral Examination	D7.1,D7.2
4	Formative (quizzes- online quizzes-presentation)	A2.1, D3.2, D7.3, D15.1
5	Final Term Examination (written)	A2.2, D3.1, D3.2, D7.2, D7.3, D21.1, D15.1, A2.1

7.2 Assessment Schedule:

No.	**Assessment Method**	**Weeks**
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes-presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	**Assessment Method**	**Weights**
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Chemmangattuvalappil, N. G., Chon, C. H., Sum, K. D. N., Elyas, R., Chen, C., Chien, L. I., Lee, H., Elms, R. D., & Foo, D. Chemical Engineering Process Simulation (1st ed.). Elsevier (2017).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Excel spreadsheet and MATLAB. Fundamental of process simulation using rigorous simulation packages	7	A2.2, D3.1, D3.2
2	Aspen-Hysys computer simulations: streams, reaction kinetics, reactors, separation processes, exchangers, pumps/compressors/heat exchanger networks, flash drums, absorbers, plug flow reactors	7	D7.1, D7.2, D7.3
3	Mid-Term	7	A2.2, D3.1, D3.2, D7.2, D7.3
4	Aspen-Hysys computer simulations: streams, reaction kinetics, reactors, separation processes, exchangers, pumps/compressors/heat exchanger networks, flash drums, absorbers, plug flow reactors	6,7	D7.4, D15.1, D21.1
5	Case studies/project and applications/oral presentations	6,7	D7.4, D3.2, A2.1

Course: Gas Process Simulation	
Program LO's	**Course LO's**
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Use Aspen Hysys to simulate processes and analyze results of equipment sizing and operating/design variables.
	A2.2 Apply MATLAB program whenever needed to solve models.
D3. Use computational facilities and techniques, measuring instruments, workshops, and laboratory equipment to design experiments, collect, analyze and interpret results.	D3.1 Use Excel spreadsheet for engineering problems solving of differential equations/algebraic equations.
	D3.2 Analyze results of process simulations and excel tool to understand performance of chemical reactors with set of reactions.
D7. Apply numerical modeling methods and/or computational techniques.	D7.1 Investigate conservation of mass, energy, and momentum conceptually.
	D7.2 Investigate principles of chemical reaction equilibrium and thermodynamics, mass and energy balance, transport processes, separation processes, and process control.
	D7.3 Practice designing principles related to specific to cases of separation sequences, reaction systems, exchangers, etc.

	D7.4 Create various mathematical models for applications with various degrees of assumptions.
D15. "Use specialist computer applications and mathematical models to maximize the performance of all Natural gas engineering stages ."	D15.1 Select Excel/Hysys to solve mathematical models build for chemical engineering applications.
D21. Conduct troubleshooting in natural gas processing plants.	D21.1 Apply conservation laws of mass and energy to chemical processes and differential equation techniques for problem solutions.

Course Coordinator: Dr. Ahmed El-Mohamdy

Program Coordinator: Prof.Dr. Mohamed Bassyouni

Approval Date: 28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP703 Flow in Porous Media**		
Year/ Level	4th level		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	**Aim**
7	Apply analytical and natural gas engineering processes by an analysis method for reservoir simulation to enhance prediction of recovery and apply Software for reservoir simulation to enhance prediction of recovery.

3. Learning Outcomes (LO's):

A2.1	Apply Software for fluid flow in porous media simulation to enhance prediction of recovery.
A4.1	Apply safe systems at work and observe the appropriate steps to manage risks in gas fields.
D13.1	Analyze geological data applied to hydrocarbon reservoirs and fluid migration in soils.
D17.1	Practice an analysis method for reservoir simulation to enhance prediction of recovery and apply Software for reservoir simulation to enhance prediction of recovery.
D20.1	Design a model by using Software for reservoir simulation.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** Fundamentals of fluid flow in porous media: pore structure, capillarity, single phase flow, immiscible and miscible fluid flow, pore level modeling of porous media. **Tutorials:** review the pore structure, capillarity, pore level modeling of porous media.	1-3
2	**Lecture:** Concept applied to hydrocarbon reservoirs and fluid migration in soils **Tutorials:** review of to hydrocarbon reservoirs and fluid migration in soils/Quiz	4-7
3	Mid-Term	8
4	**Lecture:** single phase flow in porous media, capillarity, wettability, routine. **Tutorials:** review of single phase flow in porous media, capillarity, wettability, routine.	9-10
5	**Lecture:** Similarity and differences between hydrocarbon reservoirs and soils. **Tutorial:** Quiz	11-12
6	**Lecture:** Introduction to enhanced oil and gas processes. **Tutorial:** Examples in Oil and gas recovery calculations	13-14

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture(online/In class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A2.1	X				X									
	A2.2	X	X				X								
D-Level	D3.1	X				X									
	D3.2	X						X						X	
	D7.1	X			X	X	X	x			X				
	D7.2					X	X							X	
	D7.3	X					X				x			X	
	D7.4	X			X	x									
	D15.1	X					X								
	D21.1	X					X							X	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	D13.1, A2.1, A4.1
2	Practical Examination	---
3	Oral Examination	D13.1
4	Formative (quizzes- online quizzes- presentation)	D17.1, D20.1
5	Final Term Examination (written)	A2.1, A4.1, D13.1, D17.1, D20.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	0
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	"Petroleum Engineering". Britannica. Retrieved 3 February 2012.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lecture:** Fundamentals of fluid flow in porous media: pore structure, capillarity, single phase flow, immiscible and miscible fluid flow, pore level modeling of porous media. **Tutorials:** review the pore structure, capillarity, pore level modeling of porous media.	7	A2.1, A4.1, D13.1
2	**Lecture:** Concept applied to hydrocarbon reservoirs and fluid migration in soils **Tutorials:** review of to hydrocarbon reservoirs and fluid migration in soils/Quiz	7	A4.1, A2.1, D13.1
3	Mid-Term	7	D13.1, A2.1, A4.1
4	**Lecture:** single phase flow in porous media, capillarity, wettability, routine. **Tutorials:** review of single phase flow in porous media, capillarity, wettability, routine.	7	D13.1, D17.1, D20.1
5	**Lecture:** Similarity and differences between hydrocarbon reservoirs and soils. **Tutorial:** Quiz	7	D17.1, D20.1, D13.1
6	**Lecture:** Introduction to enhanced oil and gas processes. **Tutorial:** Examples in Oil and gas recovery calculations	7	D20.1, D17.1

Course: Flow in Porous Media	
Program LO’s	**Course LO’s**
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Apply Software for fluid flow in porous media simulation to enhance prediction of recovery.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1 Apply safe systems at work and observe the appropriate steps to manage risks in gas fields.
D13. "Analyze geological data, interpret well-logs, estimate hydrocarbon reserves and evaluate reservoir performance by applying the principles and basic concepts of: geology, geophysics and reservoir engineering."	D13.1 Analyze geological data applied to hydrocarbon reservoirs and fluid migration in soils.
D17. Select appropriate solutions for engineering problems and enhanced gas recovery based on analytical thinking and Select appropriate mathematical and computer-based methods for modeling and analyzing problems.	D17.1 Practice an analysis method for reservoir simulation to enhance prediction of recovery and apply Software for reservoir simulation to enhance prediction of recovery.
D20. Create and/or re-design a process, component, or system, and carry out specialized engineering designs related to gas reservoir and well drilling and completion.	D20.1 Design a model by using Software for reservoir simulation.

Course Coordinator: Eng. Abdallah Darweesh

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date : 28/ 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Natural Gas Engineering		
Course Code	**NGP704 Advanced Well Drilling Engineering,**		
Year/ Level	4th Level		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
6	Act professionally in design and supervision of oil and natural gas well operations including
8	Use the modern technologies and material safety data sheets while designing drilling rig equipment and developing the wells.

3. Learning Outcomes (LO's):

A1.1	Solve drilling & Tripping Parameters Problems.
A1.2	Define the drilling Services, Equipment, Materials & Tools.
D14.1	Explain Mud, CSG, CMT, Liner, OHL, WH ... Problems & Failures.
D14.2	Organize Well Control While Drilling (B, OB & UB) - (Kicks, Blowout ...).
D14.3	Modify drilling rig types of Equipment, Tubular, Systems.
D20.1	Appraise drilling Assy., BHA Design (Rotary & DD) & Hydraulics.
D20.2	Investigate Stuck Pipe Prevention, Wash Over & Fishing Operations.
D20.3	Deal with bottom hole assembly and drill string design
D20.4	Manage abnormal pressure detection.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** Drilling Services, Equipment, Materials & Tools **Tutorials:** review of Drilling Services, Equipment, Materials & Tools	1
2	**Lectures:** Drilling rig types of Equipment, Tubular, Systems **Tutorials:** review of Drilling rig types of Equipment, Tubular, Systems	2-3
3	**Lectures:** Drilling Assy., BHA Design (Rotary & DD) & Hydraulics. **Tutorials:** examples applied in BHA Design (Rotary & DD) & Hydraulics.	4-5

4	**Lectures:** Rig Equipment, BHA & Bits Problems & Failures (WO, TO). **Tutorials: quiz**	6-7
5	Midterm	8
6	**Lectures:** Mud, CSG, CMT, Liner, OHL, WH ... Problems & Failures. **Tutorials:** review the problems of **:** Mud, CSG, CMT, Liner, OHL and WH	9-10
7	**Lectures:** Drilling & Tripping Parameters Problems. **Tutorials:quiz**	11-12
8	**Lectures:** Well Control While Drilling (B, OB & UB) - (Kicks, Blowout ...). **Tutorials:** review examples in Well Control While Drilling (B, OB & UB)	13
9	**Lectures:** Stuck Pipe Prevention, Wash Over & Fishing Operations. **Tutorials:** review of Stuck Pipe Prevention, Wash Over & Fishing Operations.	14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A1.1	x	x				x								
	A1.2	x				x		x		x		x			
D-Level	D14.1	x				x		x		x					
	D14.2	x						x			x				
	D14.3	x				x	x	x							
	D20.1	x										x			
	D20.2	x			x					x					
	D20.3	x				x									
	D20.4	x					x								

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A1.1, A1.2, D14.3, D20.1
2	Formative (quizzes- online quizzes- presentation)	A1.2, D14.2, D20.4
3	Final Term Examination (written)	A1.1, A1.2, D14.1, D14.2, D14.3, D20.1, D20.2, D20.3, D20.4

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation –reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
3	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	"Drilling Automation". *Journal of Petroleum Technology. December 14, 2017.*

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** Drilling Services, Equipment, Materials & Tools **Tutorials:** review of Drilling Services, Equipment, Materials & Tools	6	A1.2,D14.1
2	**Lectures:** Drilling rig types of Equipment, Tubular, Systems **Tutorials:** review of Drilling rig types of Equipment, Tubular, Systems	6	A1.1, A1.2, D14.3
3	**Lectures:** Drilling Assy., BHA Design (Rotary & DD) & Hydraulics. **Tutorials:** examples applied in BHA Design (Rotary & DD) & Hydraulics.	8	D14.2,D14.3,D20.1
4	**Lectures:** Rig Equipment, BHA & Bits Problems & Failures (WO, TO). **Tutorials: quiz**	8	D1.2,D20.3,D20.4
5	Midterm	6,8	A1.1, A1.2, D14.3, D20.1
6	**Lectures:** Mud, CSG, CMT, Liner, OHL, WH ... Problems & Failures. **Tutorials:** review the problems of **:** Mud, CSG, CMT, Liner, OHL and WH	6	D14.1, D14.3,D20.1,D20.4
7	**Lectures:** Drilling & Tripping Parameters Problems. **Tutorials:quiz**	8	A1.1, D20.3,D20.4
8	**Lectures:** Well Control While Drilling (B, OB & UB) - (Kicks, Blowout ...). **Tutorials:** review examples in Well Control While Drilling (B, OB & UB)	6	D14.1,D14.2,D20.2
9	**Lectures:** Stuck Pipe Prevention, Wash Over & Fishing Operations. **Tutorials:** review of Stuck Pipe Prevention, Wash Over & Fishing Operations.	8	D14.3,D20.2

Course: Advanced Well Drilling Engineering	
Program LO's	**Course LO's**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1 Solve drilling & Tripping Parameters Problems.
	A1.2 Define the drilling Services, Equipment, Materials & Tools.
D14. Plan and construct oil wells, develop oilfield production programs, design early surface facilities plants and field evacuation plans by applying the principles and basic concepts of drilling engineering, production engineering, phase equilibrium, fluid mechanics and flow through porous media.	D14.1 Explain Mud, CSG, CMT, Liner, OHL, WH ... Problems & Failures.
	D14.2 Organize Well Control While Drilling (B, OB & UB) - (Kicks, Blowout ...).
	D14.3 Modify drilling rig types of Equipment, Tubular, Systems.
D20. Create and/or re-design a process, component, or system, and carry out specialized engineering designs related to gas reservoir and well drilling and completion.	D20.1 Appraise drilling Assy., BHA Design (Rotary & DD) & Hydraulics.
	D20.2 Investigate Stuck Pipe Prevention, Wash Over & Fishing Operations.
	D20.3 Deal with bottom hole assembly and drill string design.
	D20.4 Manage abnormal pressure detection.

Course Coordinator: Dr. Hossam Mansour

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date: 28/ 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Mechanical Engineering Depart		
Course Code	**NGP705 Quality Control of Natural Gas Production,**		
Year/ Level	4th Year		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
8	Use the modern technologies and material safety data sheets while designing and handling natural gas projects
9	Lead, manage, supervise a group of process and operational engineers, and apply common practice in natural gas industry to meet society's requirements of occupational health, safety, and quality standards.

3. Learning Outcomes (LO's):

A4.1	Define and solve the related problems using statistical quality control.
A4.2	Apply statistical aspects of quality control to implement the optimum solution.
A4.3	Distinguish common errors and assignable errors.
A4.4	Assess if a patch is accepted or rejected.
D12.1	Relate descriptive statistical data and control charts to measure quality.
D12.2	Manage the make of control charts to identify quality.
D12.3	Evaluate means and variance of samples.
D12.4	Manage the definition of the source of variation in a sample.
D12.5	Manage how to accept or reject samples.

4. Course Contents:

No.	Topics	Week
1	Introduction to quality; quality concepts and glossary	1
2	Introduction to statistical quality control	2
3	Statistical Methods and Management Aspects for Quality Control and Improvement	3
4	Statistical Process Control	4-5
5	Control Charts for Variables	6-7
6	Midterm exam	8

7	Control Charts for Attributes	9
8	Acceptance Sampling	10
9	Steps to Six Sigma and Management of Quality	11-12
10	Process Capability Analysis	13
11	Quality Management Systems	14

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A4.1	X		X			X								
	A4.2	X				X						X			
	A4.3	X			X						X				
	A4.4	X						X							
D-Level	D12.1	X	X			X		X							
	D2.2	X									X				
	D12.3	X					X					X			
	D12.4	X	X			X									
	D12.5	X													

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A41, A4.2, A4.3
2	Formative (quizzes- online quizzes- presentation)	A4.1, A4.2, A4.3, D12.1
3	Final Term Examination (written)	A4.1, A4.2, A4.3, A4.4, D121, D12.2, D12.3, D12.4, D12.5

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation –reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	30
3	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Speight, J. G. Handbook of Offshore Oil and Gas Operations (1st ed.). Gulf Professional Publishing (2014).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction to quality; quality concepts and glossary	8	A4.1
2	Introduction to statistical quality control	8	A4.1, A4.2
3	Statistical methods and management aspects for quality control and improvement	8	A4.2
4	Statistical process control	8	A4.1, A4.2, A4.3
5	Control charts for variables	8,9	A4.4, D12.1
6	Midterm exam		
7	Control charts for attributes	9	D12.1, D12.2
8	Acceptance sampling	9	D12.3, D12.4, D12.5
9	Steps to six sigma and management of quality	9	D12.2
10	Process Capability Analysis	8,9	A4.4, D12.2
11	Quality Management Systems	9	A4.2, D12.2

Course: Quality Control in Natural Gas Production	
Program LO’s	**Course LO’s**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1 Define and solve the related problems using statistical quality control.
	A4.2 Apply statistical aspects of quality control to implement the optimum solution.

	A4.3 Distinguish common errors and assignable errors.
	A4.4 Assess if a patch is accepted or rejected.
D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and apply quality assurance procedures and follow codes and standards.	D12.1 Relate descriptive statistical data and control charts to measure quality.
	D2.2 Manage the make of control charts to identify quality.
	D12.3 Evaluate means and variance of samples.
	D12.4 Manage the definition of the source of variation in a sample.
	D12.5 Manage how to accept or reject samples.

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date: 28/ 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP706 Liquefaction of Natural Gas**		
Year/ Level	**4th Level**		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	**Aim**
7	Apply analytical and natural gas engineering processes with proficiency aided by modern engineering tools to design LNG plants.
8	Use the modern technologies and material safety data sheets while designing and LNG plants according to the safety requirements..

3. Learning Outcomes (LO's):

A4.1	Apply material selection for LNG plant, storage, and transportation.
A4.2	Formulate LNG plant operations (instrumentation, control, and safety systems).
A4.3	Design LNG plants according to the safety requirements.
A4.4	Relate LNG storage and transportations to be safe and economical.
A4.5	Investigate the processing series to follow the Safety - Control - Environmental Considerations.
D15.1	Use specialist computer applications and mathematical models to design LNG plants.
D16.1	Define feed gas processing for LNG production.
D16.2	Explain liquefaction and regasification processes.
D16.3	Identify liquefaction thermodynamics and energy analysis.

4. Course Contents:

No.	**Topics**	**Week**
1	**Lectures**: Introduction to natural gas liquefaction processes **Tutorials:** review of natural gas liquefaction processes	1
2	**Lectures**: Pre-treatment of Natural gas for liquefaction process	2
3	**Lectures**: Liquefaction Cycles	3-4

	Tutorials: review of Liquefaction Cycles	
4	**Lectures**: Liquefaction Thermodynamics and Exergy Analysis **Tutorials:** examples applied in Liquefaction Thermodynamics	5-7
5	Midterm	8
6	**Lectures**: Developing the Optimal Process Cycle **Tutorials:quiz**	9
7	**Lectures**: Storage of LNG **Tutorials:** review of Storage of LNG	10
8	**Lectures**: Transportation of LNG **Tutorials:** review of Transportation of LNG	11
9	**Lectures**: Regasification and Cold Utilization	12
10	**Lectures**: Economics of LNG Production **Tutorials:** review of Economics of LNG Production	13
11	**Lectures**: Safety - Control - Environmental Considerations **Tutorials:** review of Safety - Control - Environmental Considerations	14
12	**Lectures**: LNG History and Case Studies in Egypt	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A4.1	X													
	A4.2	X													
	A4.3	X				X	X		X		X				
	A4.4	X	X					X				X			
	A4.5	X													
D-Level	D15.1	X				X			X					X	
	D16.1	X				X				X		X			
	D16.2	X			X										
	D16.3	X				X	X								

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A4.1, A4.2, A4.3
2	Formative (quizzes- online quizzes- presentation)	A4.3, D15.1, D16.2, D16.3
3	Final Term Examination (written)	A4.1, A4.2, A4.3, A4.4, A4.5, D15.1, D16.1, D16.2, D16.3

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation –reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
3	Final Term Examination (written)	50
Total		100

8. List of References

No.	Reference List
1	***Timmerhaus, K. D., & Flynn, T. M. Cryogenic Process Engineering. Springer Publishing (2013).***
2	Saggion, A., Faraldo, R., & Pierno, M. Thermodynamics: Fundamental Principles and Applications (UNITEXT for Physics) (1st ed. 2019 ed.). Springer

	(2019).
3	Mokhatab, S., Mak, J. Y., Valappil, J., & Wood, D. A. Handbook of Liquefied Natural Gas (1st ed.). Gulf Professional Publishing (2013).
4	Hrastar, John Liquid Natural Gas in the United States: A History (First ed.). Jefferson, North Carolina: McFarland & Company, Inc., Publishers (2014).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction to natural gas liquefaction processes	7	D16.1
2	Pre-treatment of Natural gas for liquefaction process	8	A4.2, D16.1, D16.2
3	Liquefaction Cycles	7,8	D16.1, D16.2
4	Liquefaction Thermodynamics and Exergy Analysis	7,8	D16.3
5	Midterm	7,8	A4.1, A4.2, A4.3
6	Developing the Optimal Process Cycle	8	A4.2, A4.3, A4.5
7	Storage of LNG	7	A4.1, A4.5
8	Transportation of LNG	8	A4.1, A4.4
9	Regasification and Cold Utilization	8	D16.1, D16.2
10	Economics of LNG Production	7,8	A4.4
11	Safety - Control - Environmental Considerations	8	A4.3, A4.4, A4.5
12	LNG History and Case Studies in Egypt	8	A4.3, D15.1

Course: Liquefaction of Natural Gas	
Program LO's	**Course LO's**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines health	A4.1 Apply material selection for LNG plant, storage, and transportation.

and safety requirements, environmental issues, and risk management principles.	A4.2 Formulate LNG plant operations (instrumentation, control, and safety systems).
	A4.3 Design LNG plants according to the safety requirements.
	A4.4 Relate LNG storage and transportations to be safe and economical.
	A4.5 Investigate the processing series to follow the Safety - Control - Environmental Considerations.
D15. Use specialist computer applications and mathematical models to maximize the performance of all-Natural gas engineering stages.	D15.1 Use specialist computer applications and mathematical models to design LNG plants.
D16. Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer.	D16.1 Define feed gas processing for LNG production.
	D16.2 Explain liquefaction and regasification processes.
	D16.3 Identify liquefaction thermodynamics and energy analysis.

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date : 28/ 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP707 Natural Gas Derivatives**		
Year/ Level	4th Level		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
2	Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles in field of petrochemicals production processes
5	Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages to deal with academic/professional challenges in a critical and creative manner

3. Learning Outcomes (LO's):

A1.1	Identify petrochemicals production processes.
A1.2	Evaluate boiling point's w.r.t pressure using Clausius-Clapeyron model.
A5.1	Interpret the results and communicate effectively in a team for a project (oral and writing).
A10.1	Distinguish main and side chemical reactions, properties of raw materials, applications of products, types of reactors and separation units.
A10.2	Analyze and evaluate the local petrochemicals production processes with respect to global productions processes.
D9.1	Define and memorize graphical symbols for piping systems and plants.
D9.2	Sketch chemical processes using proper software such as "Visio".
D9.3	Show flowsheets of petrochemicals processes using "Visio" software.
D22.1	Create energy integrated process diagram through petrochemicals productions.

4. Course Contents:

No.	Topics	Week
1	Process units and functions & Graphical Symbols for Piping Systems and Plant	1-2
2	Introduction to petrochemicals processes and technology	3
3	• Methanol from Synthesis gas route • Formaldehyde from Methanol • Chloromethanes from methane	4
4	• Ethylene and acetylene production via steam cracking of hydrocarbons • Vinyl chloride from ethylene using two-step process	5
5	• Ethanolamine from ethylene • Isopropanol from Propylene • Cumene from propylene	6
6	• Acrylonitrile from propylene • Oxo process for converting olefins and synthesis gas to aldehydes and alcohols	7
7	Midterm	8
8	• Butadiene from Butane. • Hydrodealkylation of Toluene. • Phenol from Cumene	9
9	Phenol from Toluene Oxidation-Styrene from Benzene	10
10	• Phthalic anhydride from o-xylene • Maleic anhydride from Benzene • Dichlorodiphenyltric (DDT) manufacture from Benzene	11
11	Processing of Plastics: Thermoplastic Thermoset	12-13
12	• Polymers applications • Advanced polymers	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A1.1	x	x								x				
	A1.2	x					x					x			
	A5.1				x	x			x		x	x			
	A10.1	x			x			x							
	A10.2	x				x									
D-Level	D9.1	x										x			
	D9.2	x				x		x			x			x	
	D9.3	x												x	
	D22.1	x													

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.2, A1.2, A10.1, D9.1
2	Formative (quizzes- online quizzes- presentation)	A1.2, D9.1, D9.3, D22.1
3	Final Term Examination (written)	A1.1, A1.2, A5.1, A10.1، A10.2, D9.1, D9.2, D9.3, D22.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation –reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
3	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Chaudhuri, Uttam Ray. Fundamentals of petroleum and petrochemical engineering. CRC Press, (2016).
2	Speight, J. G. Handbook of Petrochemical Processes (Chemical Industries) (1st ed.). CRC Press (2019).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Process units and functions & Graphical Symbols for Piping Systems and Plant	1	D9.1
2	Introduction to petrochemicals processes and technology	1,5	A1.1, A1.2, A10.1
3	• Methanol from Synthesis gas route • Formaldehyde from Methanol • Chloromethanes from methane	1, 5	A5.2, A10.2, D9.2, D9.3, D22.1
4	• Ethylene and acetylene production via steam cracking of hydrocarbons • Vinyl chloride from ethylene using two-step process	1,5	A5.2, A10.2, D9.2, D9.3, D22.1
5	• Ethanolamine from ethylene • Isopropanol from Propylene • Cumene from propylene	1,5	A5.2, A10.2, D9.2, D9.3, D22.1
6	• Acrylonitrile from propylene • Oxo process for converting olefins and synthesis gas to aldehydes and alcohols	1,5	A5.2, A10.2, D9.2, D9.3, D22.1
7	Midterm	1	A1.2, A1.2, A10.1, D9.1
8	• Butadiene from Butane. • Hydrodealkylation of Toluene. • Phenol from Cumene	1,5	A5.2, A10.2, D9.2, D9.3, D22.1
9	• Phenol from Toluene Oxidation • Styrene from Benzene	1,5	A5.2, A10.2, D9.2, D9.3, D22.1
10	• Phthalic anhydride from o-xyle • Maleic anhydride from Benzene • Dichlorodiphenyltric (DDT) manufacture from Benzene	1,5	A5.2, A10.2, D9.2, D9.3, D22.1
11	Processing of Plastics: Thermoplastic Thermoset	1,5	A5.2, A10.2, D9.2, D9.3, D22.1

12	• Polymers applications • Advanced polymers	1,5	A5.2, A10.2, D9.2, D9.3, D22.1

Course: Natural Gas Derivatives	
Program LO’s	**Course LO’s**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1 Identify petrochemicals production processes.
	A1.2 Evaluate boiling point’s w.r.t pressure using Clausius-Clapeyron model.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Interpret the results and communicate effectively in a team for a project (oral and writing).
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Distinguish main and side chemical reactions, properties of raw materials, applications of products, types of reactors and separation units.
	A10.2 Analyze and evaluate the local petrochemicals production processes with respect to global productions processes.
D9. Exchange knowledge and skills with engineering community and industry.	D9.1 Define and memorize graphical symbols for piping systems and plants.
	D9.2 Sketch chemical processes using proper software such as “Visio”.
	D9.3 Show flowsheets of petrochemicals processes using “Visio” software.
D22. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services in natural gas processing and applications.	D22.1 Create energy integrated process diagram through petrochemicals productions.

Course Coordinator: Dr. Mohamed Bassyouni

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NG 708 Natural Gas Applications**		
Year/ Level	4th Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
2	Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles

3. Learning Outcomes (LO's):

A3.1 Work in teams for small assignment and communicate effectively in groups
D7.1 Review numerical solution of algebraic equations and ordinary differential equations. Review mass/energy balance.
D15.1 Apply Excel spreadsheet for engineering problems solving of differential equations/ algebraic equations. Outline fundamentals of MATLAB /HYSIS to solve and program for problem solving .
D15.2 Apply Aspen-Hysys basics for simulation of basic and simple problems .
D15.3 Compare between Excel and MATLAB / HYSIS performance in problem solving of NG engineering problems .
D16.1 Apply conservation laws of mass and energy to NG processes. Apply differential equation techniques for problem solutions
D22.1. merge the engineering knowledge to improve design in natural gas processing and its applications.

4. Course Contents:

No.	Topics	Week
1	Introduction to computer applications and problem solving	1
2	Basic principles and calculations of Mass balance: Mass separation applications: distillation	2-3
3	Solution of system of algebraic equations using Excel Spreadsheet.	4-5

	Fundamentals of numerical solution methods, e.g. Euler Method, Runge-Kutta Method. Problem solving using Excel. Applications of fluid mechanics	
4	Solution of ordinary differential equations using Excel Spreadsheet. Application to reactor with set of simultaneous reactions. Optimize selectivity	6-7
5	Fundamentals and basics of process simulation of chemical engineering applications. Problem solving using rigorous simulators, e.g. Aspen Plus/HYSYS	8
6	**Mid term**	9
7	Applications of plug flow reactor/separation vessel using HYSYS. Fundamental and basics of programming using MATLAB	10-11
8	Solution of ordinary differential equations using MATLAB	12
9	Applications in heat transfer, and heat exchangers	13-14
10	Case studies/project and applications/oral presentations	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A3.1**	**x**	**x**	**x**											

D-Level	**D7.1**	**x**	**x**		**x**	**x**									
	D15.1	**x**		**x**	**x**	**x**								**X**	
	D15.2	**x**			**x**	**x**								**X**	
	D15.3	**x**												**X**	
	D16.1	**x**	**x**												
	D22.1	**x**					**x**								

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A3.1 / D7.1 / D15.1 /D15.2 /D15.3
2	Practical Examination	-
3	Oral Examination	-
4	Formative (quizzes- online quizzes-presentation)	D7.1/D15.1/ D15.2 / D15.3 / D16.1/D22.1
5	Final Term Examination (written)	A3.1 / D 7.1 / D15.1/ D15.2 / D15.3 / D16.1/ D22.1

7.2 Assessment Schedule:

No.	**Assessment Method**	**Weeks**
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes-presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Vasile, M., Minisci, E. and Quagliarella, D."Computational methods in engineering design and optimization", Engineering Computations, Vol. 30 No. 4. (2013).
2	Green, D., & Southard, M. Z. Perry's Chemical Engineers' Handbook, 9th Edition (9th ed.). McGraw-Hill Education (2018).
3	Stormy Attaway, MATLAB: A Practical Introduction to Programming .and Problem Solving, 3rd Edition; Butterworth-Heinemann, 2013
4	William Palm III, Introduction to MATLAB for Engineers, 3rd Edition; .McGraw-Hill, 2010

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction to computer applications and problem solving	2	A3.1 / D7.1
2	Basic principles and calculations of Mass balance: Mass separation applications: distillation	2	A3.1 / D7.1

3	Solution of system of algebraic equations using Excel Spreadsheet. Fundamentals of numerical solution methods, e.g. Euler Method, Runge-Kutta Method. Problem solving using Excel. Applications of fluid mechanics	2	D15.1 /D15.2 /D15.3
4	Solution of ordinary differential equations using Excel Spreadsheet. Application to reactor with set of simultaneous reactions. Optimize selectivity	2	D15.1 /D15.2 /D15.3
5	Fundamentals and basics of process simulation of chemical engineering applications. Problem solving using rigorous simulators, e.g. Aspen Plus/HYSYS	2	D15.1 /D15.2 /D15.3
6	**Mid term**	2	A3.1 / D7.1 / D15.1 /D15.2 /D15.3
7	Applications of plug flow reactor/separation vessel using HYSYS. Fundamental and basics of programming using MATLAB	2	D15.1,D15.2 D15.3,D22.1
8	Solution of ordinary differential equations using MATLAB	2	D7.1,D16.1
9	Applications in heat transfer, and heat exchangers	2	D16.1,D22.1
10	Case studies/project and applications/oral presentations	2	D16.1 ,D22.1

Course: Natural Gas Applications	
Program LO's	**Course LO's**
A.3 Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental، ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.1 Work in teams for small assignment and communicate effectively in groups
D.7 Apply numerical modeling methods and/or computational techniques.	D7.1 Review numerical solution of algebraic equations and ordinary differential equations. Review mass/energy balance.
D.15 Use specialist computer applications and mathematical models to maximize the performance of all-Natural gas engineering stages .	D15.1 Apply Excel spreadsheet for engineering problems solving of differential equations/ algebraic equations. Outline fundamentals of MATLAB /HYSIS to solve and program for problem solving . D15.2 Apply Aspen-Hysys basics for simulation of basic and simple problems . D15.3 Compare between Excel and MATLAB / HYSIS performance in problem solving of NG engineering problems .
D.16 Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer.	D16.1 Apply conservation laws of mass and energy to NG processes. Apply differential equation techniques for problem solutions
D22. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services in natural gas processing and applications.	D22.1. merge the engineering knowledge to improve design in natural gas processing and its applications.

Course Coordinator: Dr. Mamdouh Gadalla

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date: 28/ 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP709 Natural Gas & Liquefied Natural Gas Vehicles**		
Year/ Level	4th Year		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
8	Use the modern technologies and material safety data sheets while designing Natural Gas & Liquefied Natural Gas Vehicles
9	Lead, manage, supervise a group of process and operational engineers, and apply common practice in natural gas industry to meet society's requirements of occupational health, safety, and quality standards by Appling engineering principles, theories, and methods in solving environmental, safety and economic problems.

3. Learning Outcomes (LO's):

A4.1	Explain the sources and processing of gaseous fuels.
A4.2	List the primary emissions from transportation uses and identify the sources and remedies for each
A4.3	Explain lean-burn technology and calculate the correct air-fuel ratio to achieve best power, lowest emissions, and greatest fuel economy.
D10.1	Apply engineering principles, theories, and methods in solving environmental, safety and economic problems.
D16.1	For natural gas describe the advantages and disadvantages of the NG & LNG vehicles.
D16.2	Describe the modifications needs for gasoline engine to be converted to NG or LNG vehicles.
D16.3	Describe the Natural gas internal combustion engine, the Components of an LNG fuel system and explain how each operates & the operation of the ignition system and its components.
D16.4	Describe otto and diesel cycle engines and explain how combustion is different with a gaseous fuel.

4. Course Contents:

No.	Topics	Week
1	the primary emissions from transportation uses	1-2
2	Otto and diesel cycle engines	3-4
3	combustion is different with a gaseous fuel.	5-6
4	lean-burn technology and calculate the correct air-fuel ratio to achieve best power, lowest emissions, and greatest fuel economy	7-8
5	MIDTERM EXAM	9
6	the Natural gas internal combustion engine	10-11
7	The components of an LNG fuel system and explain how each operates.	12
8	the advantages and disadvantages of the NG & LNG vehicles.	13
9	the modifications need for Gasoline engine to be converted to NG or LNG vehicles.	14-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A4.1	**X**				**X**									
	A4.2	**X**	**X**		**X**										
	A4.3	**X**					**X**		**X**		**X**				
D-Level	D10.1	**X**						**X**							
	D16.1	**X**				**X**									
	D16.2	**X**					**X**				**X**				
	D16.3	**X**					**X**	**X**							
	D16.4	**X**													

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A4.1, A4.2, D16.3, D16.4
2	Formative (quizzes- online quizzes- presentation)	A4.2, A4.3, D10.1
3	Final Term Examination (written)	A4.1, A4.2, A4.3, D10.1, D16.1, D16.2, D16.3, D16.4

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation –reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
3	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	"Petroleum Engineering". *Britannica*. Retrieved 3 February (2012).
2	"Drilling Automation". *Journal of Petroleum Technology (2017).*

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	The primary emissions from transportation uses	8	A4.1
2	Otto and diesel cycle engines	8	A4.2
3	combustion is different with a gaseous fuel.	8	A4.1/ A4.2
4	lean-burn technology and calculate the correct air-fuel ratio to achieve best power, lowest emissions, and greatest fuel economy	8	A4.3 /D16.3/D16.4
5	MIDTERM EXAM	8	A4.1, A4.2, D16.3, D16.4
6	the Natural gas internal combustion engine	9	D10.1
7	The components of an LNG fuel system and explain how each operates.	9	D16.1 / D16.2
8	the advantages and disadvantages of the NG & LNG vehicles.	9	D16.3 / D16.4
9	the modifications needs for Gasoline engine to be converted to NG or LNG vehicles.	9	D16.1 / D16.2 / D16.3 / D16.4

Course: Natural Gas and Liquified Natural Gas Vehicles	
Program LO’s	**Course LO’s**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1 Explain the sources and processing of gaseous fuels. A4.2 List the primary emissions from transportation uses and identify the sources and remedies for each. A4.3 Explain lean-burn technology and calculate the correct air-fuel ratio to achieve best power, lowest emissions, and greatest fuel economy.

D10. Incorporate economic, societal, environmental dimensions and risk management in design.	D10.1 Apply engineering principles, theories, and methods in solving environmental, safety and economic problems.
D16. Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer.	D16.1 For natural gas describe the advantages and disadvantages of the NG & LNG vehicles. D16.2 Describe the modifications needs for gasoline engine to be converted to NG or LNG vehicles. D16.3 Describe the Natural gas internal combustion engine, the Components of an LNG fuel system and explain how each operates & the operation of the ignition system and its components. D16.4 Describe otto and diesel cycle engines and explain how combustion is different with a gaseous fuel.

Program Coordinator: Prof.Dr. Mohamed Bassyouni

Date : 28/ 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP710 Environmental Engineering for Natural Gas Sector**		
Year/ Level	4th Year		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	**2**	-

2. Course aims:

No.	Aim
8	Use the modern technologies and material safety data sheets while designing and handling natural gas projects.
9	Lead, manage, supervise a group of process and operational engineers, and apply common practice in natural gas industry to meet society's requirements of occupational health, safety, and quality standards.

3. Learning Outcomes (LO's):

A3.1.	Define the environmental legalization and environmental-related parameters that affect the design process.
A.4.1	Determine the rule of thumb and environmental standards or best practices involved in natural gas industry.
D10.1	Assess the environmental consideration for any process in the natural gas industry.
D12.1	Apply the procedures that assure quality and follow the environmental regulations and legalizations.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** overview of environmental issues for oil and gas **Labs/Tutorials:** Review examples about environmental issues in gas industry	1-2
2	**Lectures:** environmental principles relevant to gas industry (air , water , land components) **Labs/Tutorials:** Apply environmental principles on natural gas processes	3-5
3	**Lectures:** chemical use and discharge **Labs/Tutorials:**	6-7

	review of some materials (chemicals) safety data sheets	
4	Midterm	8
5	**Lectures:** Chemical waste disposal **Labs/Tutorials:** best practical environmental option for specific waste disposals	9-11
6	**Lectures:** environmental management systems. **Labs/Tutorials:** Review applications for environmental management systems	12-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A3.1.**	**X**				**X**		**X**							
	A.4.1	**X**				**X**		**X**							
D-Level	**D10.1**	**X**				**X**		**X**	**X**						
	D12. 1	**X**				**X**			**X**						

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A3.1., A.4.1, D10.1
2	Practical Examination	-
3	Oral Examination	-
4	Formative (quizzes- online quizzes- presentation)	A3.1., A.4.1
5	Final Term Examination (written)	A3.1., A.4.1, D10.1, D12.1.

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	biweekly
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	25
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	25
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	"Petroleum Engineering". *Britannica*, 2012.
2	"Drilling Automation". *Journal of Petroleum Technology, 2017.*
3	"JPT Flow Sensor Technology Seeks to Replace the Coriolis Meter". *www.spe.org.* Retrieved 2017.
4	"JPT Competing Companies Building Robots to Place Receivers". *www.spe.org.* Retrieved 2017.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** overview of environmental issues for oil and gas **Labs/Tutorials:** Review examples about environmental issues in gas industry	2	A3.1
2	**Lectures:** environmental principles relevant to gas industry (air , water , land components) **Labs/Tutorials:** Apply environmental principles on natural gas processes	2	A3.1, A4.1
3	**Lectures:** chemical use and discharge **Labs/Tutorials:** review of some materials (chemicals) safety data sheets	9	D10.1
4	Midterm	9	
5	**Lectures:** Chemical waste disposal **Labs/Tutorials:** best practical environmental option for specific waste disposals	9	D10.1
6	**Lectures:** environmental management systems. **Labs/Tutorials:** Review applications for environmental management systems	9	D10.1,D12.1

Course: Environmental Engineering for Natural Gas Sector	
Program LO's	**Course LO's**
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.1. Define the environmental legalization and environmental-related parameters that affect the design process.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A.4.1 Determine the rule of thumb and environmental standards or best practices involved in the natural gas industry.
D10. Incorporate economic, societal, environmental dimensions and risk management in design.	D10.1 Assess the environmental consideration for any process in the natural gas industry.
D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and Apply quality assurance procedures and follow codes and standards.	D12. 1 Apply the procedures that assure quality and follow the environmental regulations and legalizations.

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date : 28/ 3 / 2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP711 (Natural Gas Field Safety)**		
Year/ Level	4th Year		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
6	Act professionally in design and supervision of safe natural gas operations
9	Lead, manage, supervise a group of process and operational engineers, and apply common practice in natural gas industry to meet society's requirements of occupational health, safety, and quality standards.

3. Learning Outcomes (LO's):

A6.1.	Identify the hazards and risks involved in any process in natural gas industry.
A7.1.	Determine the risks related to tasks, processes, and environment surrounding the concerned working area
D12.1.	Apply control measures that eliminate or mitigate the identified risks according to the standards and best practices.
D21.1.	Discuss the procedures followed in maintenance and troubleshooting activities considering hazard identification and risk assessment.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** Fire risks and mitigations **Labs/Tutorials:** Review of Safety issues of blow outs and fire	1-3
2	**Lectures:** hydrate formation and decomposition **Labs/Tutorials:** Review risks and control measures to prevent hydrate formation	4-5
3	**Lectures:** H2S and toxic gases handling **Labs/Tutorials:** Review examples about H2S handling facilities and the required precautions	6-7
4	Midterm	8
5	**Lectures:**	9-11

	impact of petroleum operations on the environment **Labs/Tutorials:** Review the environmental impact of natural gas processes	
6	**Lectures:** handling and safe transportation and disposal of petroleum wastes. **Labs/Tutorials:** Review the procedures of petroleum wastes disposal	12-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A6.1.	**X**				**X**		**X**							
	A7.1.	**X**				**X**		**X**							
D-Level	D12.1.	**X**				**X**		**X**	**X**						
	D21.1.	**X**				**X**			**X**						

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LO's**
1	Mid Term Examination (written/ online)	A6.1., A7.1.
2	Practical Examination	-
3	Oral Examination	-
4	Formative (quizzes- online quizzes-presentation)	A6.1., A7.1., D12.1
5	Final Term Examination (written)	A6.1., A7.1., D12.1., D21.1.

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	biweekly
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	25
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	25
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Spellman, F. R., & Whiting, N. E. The Handbook of Safety Engineering: Principles and Applications. Government Institutes, 2009.
2	"Petroleum Engineering". *Britannica*. Retrieved, 2012.
3	"Drilling Automation". *Journal of Petroleum Technology, 2017.*
4	"JPT Flow Sensor Technology Seeks to Replace the Coriolis Meter". *www.spe.org*. Retrieved, 2017.
5	"JPT Competing Companies Building Robots to Place Receivers". *www.spe.org*. Retrieved, 2017.
6	"JPT Robot Removes Operators from Extreme Environments". *www.spe.org*. Retrieved, 2017.
7	"SPE Member Resource Guide" *(PDF). Society of Petroleum Engineers*. Retrieved, 2017.
8	"Publications | The Society of Petroleum Engineers". *www.spe.org*. Retrieved, 2017.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** Fire risks and mitigations **Labs/Tutorials:** Review of Safety issues of blow outs and fire	6	A6.1., A7.1., D12.1
2	**Lectures:** hydrate formation and decomposition **Labs/Tutorials:** Review risks and control measures to prevent hydrate formation.	6	A6.1., A7.1., D12.1
3	**Lectures:** H2S and toxic gases handling **Labs/Tutorials:** Review examples about H2S handling facilities and the required precautions	9	A6.1., A7.1., D12.1
4	Midterm		
5	**Lectures:** impact of petroleum operations on the environment **Labs/Tutorials:** Review the environmental impact of natural gas processes	9	A6.1., A7.1., D12.1., D21.1.
6	**Lectures:** handling and safe transportation and disposal of petroleum wastes. **Labs/Tutorials:** Review the procedures of petroleum wastes disposal	6	A6.1., A7.1., D12.1., D21.1.

Course: Natural Gas Field Safety	
Program LO's	**Course LO's**
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1. Identify the hazards and risks involved in any process in natural gas industry.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	A7.1. Determine the risks related to tasks, processes, and environment surrounding the concerned working area.
D12. Apply safe systems at work and observe the appropriate steps to manage risks in gas fields and Apply quality assurance procedures and follow codes and standards.	D12.1. Apply control measures that eliminate or mitigate the identified risks according to the standards and best practices.
D21. Conduct troubleshooting in natural gas processing plants.	D21.1. Discuss the procedures followed in maintenance and troubleshooting activities considering hazard identification and risk assessment.

Course Coordinator: Dr.

Program Coordinator: Prof. Dr. Mohamed Bassyouni

1. Basic Information:

Program Title			
Department offering the Program	Chemical Engineering department		
Department Responsible for the Course	Chemical Engineering department		
Course Code	**NGP712 (Production Equipment)**		
Year/ Level	4th Year		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
6	Act professionally in design production equipment and supervision its operation parameters in natural gas industry
7	Apply analytical design of natural gas production equipment with proficiency aided by modern engineering tools

3. Learning Outcomes (LO's):

A2.1	Describe oil and gas separators, their internal components, methods of separation, treatment techniques, vessel control, and metering, associated problems, troubleshooting, and sizing; and Identify the main components, downhole, and surface equipment of gravel packing, perforation, stimulation, and shut-off operations.
A3.1	Design, analysis, and evaluation of hydraulic fracturing and matrix acidizing operations, perforation and zonal shut-off operations, sand controlling, and gravel-packing.
D14.1	Describe the design aspects of different good production operations include WSO, perforation, stimulation, and sand control.
D17.1	Determine the production system problems and troubleshoot, and Investigate the main downhole and surface problems and seeking an innovative solution in order to increase the good productivity in cost-effective manner.
D18.1	Evaluate the production equipment design and operating performance and propose feasible retrofits

4. Course Contents:

No.	Topics	Week
1	Wellhead installation, components and categories	1
2	Oil and gas separator components, design and troubleshooting	2
3	Oil and gas piping transportation, metering and instrumentation.	3
4	Basics of surface gas and oil treatment in oil fields	4-5
5	Basics of surface gas and oil treatment units design	6-7
6	Sand control techniques and operation of gravel packing	8
7	Midterm	9
8	Perforation methods, equipment and calculations	10-12
9	Stimulation of oil and gas reservoir, equipment, job procedure and design	13-14
10	Water shut-off techniques and zonal isolation	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	**A2.1**	X				X									
	A3.1	X		X		X									
D-Level	**D13.1**	X		X		X									
	D17.1	X				X	X								
	D18.1	X				X		X							

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO's
1	Mid Term Examination (written/ online)	A2.1,A3.1,D14.1
2	Practical Examination	-
3	Oral Examination	A2.1,D14.1
4	Formative (quizzes- online quizzes- presentation)	A2.1,D14.1,D17.1
5	Final Term Examination (written)	A2.1,A3.1,D14.1,D17.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Anon.,“Production Technology II”, Department of Petroleum Engineering, Heriot-Watt University, UK, 2011
2	Anon.,“Production Technology I”, Department of Petroleum Engineering, Heriot-Watt University, UK, 2011
3	Mokhatab, S., Poe, W., and Speight, J., “Handbook of Natural Gas transmission and processing”, Eleseveir Pub., 2006
4	Kinday, A., and Parrish, W., “Fundamentals of Natural Gas Processing”, Taylor and Francis Group, 2006
5	Mokhatab, S., Poe, W., and Speight, J., “Handbook of Natural Gas transmission and processing”, Eleseveir Pub., 2006

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Wellhead installation, components, and categories	6	A2.1,A3.1
2	Oil and gas separator components, design and troubleshooting	7	A2.1,A3.1,D14.1, D18.1
3	Oil and gas piping transportation, metering, and instrumentation.	7	A3.1,D17.1
4	Basics of surface gas and oil treatment in oil fields	6	A2.1,A3.1
5	Basics of surface gas and oil treatment units design	7	A3.1,D14.1
6	Sand control techniques and operation of gravel packing	6	A3.1,D17.1
7	Midterm		A2.1,A3.1,D14.1
8	Perforation methods, equipment, and calculations	6	A3.1,A17.1
9	Stimulation of oil and gas reservoir, equipment, job procedure and design	7	A2.1,D14.1, D18.1
10	Water shut-off techniques and zonal isolation	6	A2.1,A3.1.D14.1

Course: NGP 712 Production Equipment	
Program LO’s	**Course LO’s**
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1. Describe oil and gas separators, their internal components, methods of separation, treatment techniques, vessel control, and metering, associated problems, troubleshooting, and sizing; and Identify the main components, downhole, and surface equipment of gravel packing, perforation, stimulation, and shut-off operations.

A3. Apply engineering design processes to produce cost-effective solutions that meet needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A3.1. Design, analysis, and evaluation of hydraulic fracturing and matrix acidizing operations, perforation and zonal shut-off operations, sand controlling, and gravel-packing.
D14. Plan and construct oil wells, develop oilfield production programs, design early surface facilities plants and field evacuation plans by applying the principles and basic concepts of drilling engineering, production engineering, phase equilibrium, fluid mechanics and flow through porous media.	D14.1 Describe the design aspects of different good production operations include WSO, perforation, stimulation, and sand control.
D17. Select appropriate solutions for engineering problems and enhanced gas recovery based on analytical thinking and Select appropriate mathematical and computer-based methods for modeling and analyzing problems.	D17.1 Determine the production system problems and troubleshoot and Investigate the main downhole and surface problems and seeking an innovative solution in order to increase the good productivity in cost-effective manner.
D18. Evaluate and appraise designs, processes (operations), equipment and machinery, and propose improvements.	D18.1 evaluate the production equipment design and operating performance and propose feasible retrofits

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date: 28/3/2021

1. Basic Information:

Program Title			
Department offering the Program	Chemical Engineering department		
Department Responsible for the Course	Chemical Engineering department		
Course Code	**NGP713 (Enhanced Gas Recovery)**		
Year/ Level	Fourth year		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
4	Use techniques, skills, and modern engineering tools applied in enhanced gas recovery
7	Apply analytical, experimental, design, natural gas enhanced recovery with proficiency aided by modern engineering tools

3. Learning Outcomes (LO's):

A2.1	Evaluate productivity index, reservoir performance and the original hydrocarbon in place by predicting the recovery factor using charts.
D13.1	Identify the material balance equation to predict the type of reservoir fluid and recovery factor and Evaluate the original hydrocarbon in place by predicting the recovery factor using charts.
D14.1	Apply different methods to enhanced gas recovery (EGR).
D17.1	Practice an analysis method and use Software for reservoir simulation to enhance prediction of recovery.

4. Course Contents:

No.	Topics	Week
1	Introduction to the application of physical principles to increase the recovery from reservoirs.	1
2	miscible flooding; in-situ combustion; reservoir pressure, and selecting a turbo-compressor unit to enhance the pressure	2-5
3	calculation of gas recovery and heat losses	6-8
4	Midterm Exam	9
5	dewatering problem, sand problem	10-12
6	selection of suitable reservoirs	13
7	operational problems	14-15

5. Teaching and Learning Methods:

LO’s		Teaching and Learning Method													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A2.1**	X		X	X	X									
D-Level	**D13.1**	X	X	X		X	X								
	D14.1	X	X	X		X	X								
	D17.1	X				X									

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO’s
1	Mid Term Examination (written/ online)	A2.1,D13.1
2	Practical Examination	-
3	Oral Examination	A2.1
4	Formative (quizzes- online quizzes- presentation)	A2.1,D13.1,D14.1,D17.1
5	Final Term Examination (written)	A2.1,D13.1,D14.1,D17.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Ahmed, Tarek H., and Meehan, Nathan. Advanced Reservoir Engineering and Management. 2nd edition. Gulf Professional Publishing, 2011.
2	Carlson, Mike. Practical Reservoir Simulation. PennWell Corp., illustrated edition, 2004.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Introduction to the application of physical principles to increase the recovery from reservoirs	4	A2.1
2	miscible flooding; in-situ combustion; reservoir pressure, and selecting a turbo-compressor unit	7	A2.1,D13.1,D17.1

	to enhance the pressure		
3	calculation of gas recovery and heat losses	7	A2.1,D14.1
4	Midterm Exam		A2.1,D13.1
5	dewatering problem, sand problem	4	D13.1,D14.1
6	selection of suitable reservoirs	7	A2.1,D17.1
7	operational problems	4	D13.1,D14.1,D17.1

Course: Enhanced Gas Recovery	
Program LOs	**Course LOs**
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1. Evaluate productivity index, reservoir performance and the original hydrocarbon in place by predicting the recovery factor using charts.
D13. Analyze geological data, interpret well-logs, estimate hydrocarbon reserves, and evaluate reservoir performance by applying the principles and basic concepts of geology, geophysics and reservoir engineering.	D13.1. Identify the material balance equation to predict the type of reservoir fluid and recovery factor and Evaluate the original hydrocarbon in place by predicting the recovery factor using charts.
D14. Plan and construct oil wells, develop oilfield production programs, design early surface facilities plants and field evacuation plans by applying the principles and basic concepts of: drilling engineering, production engineering, phase equilibrium, fluid mechanics and flow through porous media.	D14.1. Apply different methods to enhanced gas recovery (EGR).
D17. Select appropriate solutions for engineering problems and enhanced gas recovery based on analytical thinking and Select appropriate mathematical and computer-based methods for modeling and analyzing problems.	D17.1. Practice an analysis method and use Software for reservoir simulation to enhance prediction of recovery.

Program coordinator: Prof. Dr. Mohamed Bassyouni

Date : 28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP714 (Natural Gas Industry Economics)**		
Year/ Level	4th Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	**Aim**
2	Behave professionally and adhere to engineering economics standards and work to develop the financial skills and promote sustainability principles in natural gas projects.

3. Learning Outcomes (LO's):

A3.1	Define, plan, conduct and report management techniques, evaluate and integrate information and processes through individual and group project work.
A10.1	Apply knowledge and skills with engineering community and industry.
D10.2	Analyze results of numerical models and assess their limitations.

4. Course Contents:

No.	**Topics**	**Week**
1	**Lectures: Macroeconomics of gas industry**	1-2
2	**Lectures: cash flow analysis**	3-4
3	**Lectures: cost analysis**	5-6
4	**Lectures: economic analysis and financing**	7-8
	Midterm	9
5	**Lectures: decision, risk and uncertainty**	10-11
6	**Lectures: project planning and control**	12-13
8	**Lectures: strategic and corporate planning in gas industry.**	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A3.1	X	X		X	X									
D-Level	D10.1	X	X			X									
	D10.2	X	X		X	X									

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1/D10.1
2	Practical Examination	-
3	Oral Examination	A3.1
4	Formative (quizzes- online quizzes-presentation)	D10.1/ D10.2
5	Final Term Examination (written)	A3.1 / D10.1 /D10.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	"Petroleum Engineering". Britannica (2012).
2	SPE Member Resource Guide "Society of Petroleum engineers”, (2017).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

Course: Natural Gas Industry Economics	
Program LO's	**Course LO's**
A.3 Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A.3.1 Define, plan, conduct and report management techniques, evaluate and integrate information and processes through individual and group project work.
D.10 Incorporate economic, societal, environmental dimensions and risk management in design.	D10.1 Apply knowledge and skills with engineering community and industry.
	D10.2 Analyze results of numerical models and assess their limitations.

No.	Topic	Aim	LO's
1	Lectures: Macroeconomics of gas industry	2	A3.1
2	Lectures: cash flow analysis	2	A3.1
3	Lectures: cost analysis	2	D10.1
4	Lectures: economic analysis and financing	2	D10.1/ D10.2
5	Lectures: decision, risk, and uncertainty	2	A3.1, D10.1/ D10.2
6	Lectures: project planning and control	2	D10.1/ D10.2
7	**Midterm**	2	A3.1/D10.1
8	Lectures: strategic and corporate planning in gas industry.	2	D10.1/ D10.2

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date: 28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP715 (Integrated Reservoir Management)**		
Year/ Level	4th Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
1	Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve technical problems in reservoir engineering and manage reservoir productivity.

3. Learning Outcomes (LOs):

A1.1	Identify Natural gas production technology: well drilling, well completion, well log off, well logging, enhanced well gas recovery.
A.3.1.	Create systematic and methodic approaches when dealing with new and advancing technology.
D1.1.	Describe Properties of reservoir rock and fluid in oil and gas bearing formation.
D5.1.	Work in stressful environment and within constraints.
D5.2.	Search for information and engage in life-long self-learning discipline.
D8.1.	Conduct troubleshooting in NG production sites and plants.
D19.1.	Apply different methods to enhanced gas recovery (EGR).

4. Course Contents:

No.	Topics	Week
1	Lectures: consent of faculty Integrated approaches to field development planning	1-2-3-4
2	Lectures: production forecast and optimization	5-6-7-8
3	Midterm	9
4	Lectures: reservoir performance monitoring and evaluation	10-11-12-13-14-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	X	X	X											
	A3.1	X	X		X	X									
D-Level	**D1.1**	X	X												
	D5.1	X	X	X											
	D8.1	X	X		X	X									
	D19.1	X	X												

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LO’s
1	Mid Term Examination (written/ online)	A1.1 / A3.1 / D1.1 / D5.1 / D5.2
2	Practical Examination	-
3	Oral Examination	A1.1/D1.1
4	Formative (quizzes- online quizzes- presentation)	D1.1/ D5.1 / D5.2 /D8.1/D19.1
5	Final Term Examination (written)	A1.1 / A3.1 / D1.1/ D5.1 / D5.2 /D8.1/D19.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Fink, J. Petroleum Engineer’s Guide to Oil Field Chemicals and Fluids (1st ed.). Gulf Professional Publishing (2011).
2	Mitchell, R. F., Miska, S., Aadnøy, B. S., & Society of Petroleum Engineers (U.S.). Fundamentals of Drilling Engineering, (2011).
3	Baker, R. C. Flow Measurement Handbook (Industrial Designs, Operating Principles, Performance, and Applications) (2nd ed.). Cambridge University Press (2016).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Lectures: consent of faculty Integrated approaches to field development planning	1	A1.1 / A3.1
2	Lectures: production forecast and optimization	1	D1.1 / D5.1 / D5.2
3	Midterm	1	A1.1 / A3.1 / D1.1 / D5.1 / D5.2
4	Lectures: reservoir performance monitoring and evaluation	1	D8.1 / D19.1

Course: Integrated Reservoir Management	
Program LO's	**Course LO's**
A.1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify Natural gas production technology: well drilling, well completion, well log off, well logging, enhanced well gas recovery.
A.3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	A.3.1 Create systematic and methodic approaches when dealing with new and advancing technology.
D.1 Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Measurements, and Mechanical Design.	D1.1 Describe Properties of reservoir rock and fluid in oil and gas bearing formation.
D.5 Demonstrate basic organizational and project management skills.	D5.1 Work in stressful environment and within constraints.
	D5.2 Search for information and engage in life-long self-learning discipline.
D.8 Apply knowledge of mathematics, science, information technology, design, business context and	D8.1 Conduct troubleshooting in NG production sites and plants.

engineering practice integrally to solve engineering problems.	
D.19 Analyze and interpret data related to well logs and testing, and design experiments to obtain new data.	D.19.1 Apply different methods to enhanced gas recovery (EGR).

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date : 28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP716 (Investment Management)**		
Year/ Level	4th Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
3	Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills to invest in natural gas projects and maintain the profitability of an existing projects.

3. Learning Outcomes (LO's):

A6.1	Define, plan, conduct and report management techniques, evaluate and integrate information and processes through individual and group project work
A8.1	Manage Effectively tasks, time, and resources.
A9.1	Identify knowledge and skills with engineering community and industry.
A10.1	computer programming relevant to natural gas applications
D5.1	Work in stressful environment and within constraints.

4. Course Contents:

No.	Topics	Week
1	Lectures: concepts of valuation/evaluation time value of money.	1
2	Lectures: problem framing concepts.	2
3	Lectures: economic models: input forecasting production, prices, capital costs, operating costs; depreciation.	3-4
4	Lectures: advanced analysis incremental economics.	5-6
5	Lectures: workshop problem framing.	7
6	Lectures: international issues.	8
7	Midterm.	9
8	Lectures: petroleum taxes.	10
9	Lectures: international taxation issues and value drivers.	11-12-13

10	Lectures: capital planning/allocation methods; efficient frontier; and option theory.	14-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A6.1**	**X**	**X**	**X**		**X**									
	A8.1	**X**	**X**		**X**	**X**									
	A9.1	**X**	**X**		**X**	**X**									
	A10.1	**X**	**X**		**X**	**X**									
D-Level	**D5.1**	**X**	**X**	**X**		**X**									

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A6.1 / A8.1 / A9.1 /A10.1
2	Practical Examination	-
3	Oral Examination	A6.1
4	Formative (quizzes- online quizzes- presentation)	D5.1
5	Final Term Examination (written)	A6.1 / A8.1 / A9.1 /A10.1 / D5.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Linton, D. E. Foundations of Investment Management: Mastering Financial Markets, Asset Classes, and Investment Strategies. J. Ross Publishing. (2020).
2	Bhala, T. K., Yeh, W., & Bhala, R. International Investment Management (1st ed.). Routledge (2016).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Lectures: concepts of valuation/evaluation time value of money	3	A6.1
2	Lectures: problem framing concepts	3	A6.1

3	Lectures: economic models: input forecasting costs, operating costs; production, prices, capital depreciation	3	A8.1 / A9.1
4	Lectures: advanced analysis incremental economics	3	A8.1 / A9.1
5	Lectures: workshop problem framing	3	A8.1 / A9.1
6	Lectures: international issues	3	A8.1 / A9.1
7	Midterm	3	A6.1 / A8.1 / A9.1 /A10.1
8	Lectures: petroleum taxes	3	A10.1
9	Lectures: international taxation issues and value drivers	3	A10.1 / D5.1
10	Lectures: capital planning/allocation methods; efficient frontier; and option theory.	3	A10.1 / D5.1

Course: Investment Management	
Program LO's	**Course LO's**
A.6 Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A.6.1 Define, plan, conduct and report management techniques, evaluate and integrate information and processes through individual and group project work.
A.8 Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8.1 Manage Effectively tasks, time, and resources.
A.9 Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A.9.1 Identify knowledge and skills with engineering community and industry.
A.10 Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A.10.1 computer programming relevant to natural gas applications.
D.5 Demonstrate basic organizational and project management skills.	D5.1 Work in stressful environment and within constraints.

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date:28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP717 (Subsea Technology)**		
Year/ Level	4th Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
6	Act professionally in design and supervision of subsea technologies and their application in drilling and production
8	Use the modern technologies and material safety data sheets while designing and handling natural gas subsea and deep-water projects.

3. Learning Outcomes (LO's):

A1.1	Define and understand special drilling equipment used in deep-water drilling such as pipe transfer systems and handling devices, motion compensation systems of floating units, guideline tension and riser systems, temporary and permanent guide bases, diverters, and BOP assembly.
D13.1	Design and analyze the riser system, mud gradient, pressure rating of equipment.
D13.2	Prepare engineering calculation and design including subsea riser equipment, well control and workover practical calculations.
D14.1	Evaluate Calculation of subsea equipment design , calculation of well control, design of mud and drilling fluid program ,design of marine riser components, testing analysis and data interpretation.
D20.1	Recommend programs and procedures of risk assessment management for different operations , quality control and assurance.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** Introduction to subsea technology and industry development	1
2	**Lectures:** Deepwater offshore structures and hoisting facilities	2
3	**Lectures:** Drilling & completion equipment and operation	3
4	**Lectures:** Marine riser components and design	4
5	**Lectures:** Deepwater well control challenges and calculation	5-6

6	**Lectures:** Subsea BOP configurations, components and control system	7
7	**Lectures :** Subsea production equipment and subsea tree types	8
8	**Midterm**	9
9	**Lectures**: Subsea electrical, chemical, and hydraulic control distribution units	10
10	**Lectures :** Well testing aspects of subsea wells	11-12
11	**Lectures :** Subsea workover and well intervention operations	13-14
12	**Lectures :** General Revision	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	**X**	**X**	**X**	**X**	**X**									
D-Level	**D13.1**	**X**	**X**												
	D13.2	**X**	**X**	**X**	**X**	**X**									
	D14.1	**X**	**X**												
	D20.1	**X**	**X**												

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1 / D13.1 / D13.2
2	Practical Examination	-
3	Oral Examination	A1.1
4	Formative (quizzes- online quizzes- presentation)	D13.1 /D13.2/ D14.1/ D20.1
5	Final Term Examination (written)	A1.1,D13.1,D13.2,D14.1 D20.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References

No.	Reference List
1	Bai, Y., & Bai, Q. Subsea Engineering Handbook (1st ed.). Gulf Professional Publishing (2010).
2	Bai, Q., & Bai, Y. Subsea Pipeline Design, Analysis, and Installation (1st ed.). Gulf Professional Publishing (2014).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities

3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** Introduction to subsea technology and industry development	8	A1.1
2	**Lectures:** Deepwater offshore structures and hoisting facilities	6	A1.1
3	**Lectures:** Drilling & completion equipment and operation	6	A1.1
4	**Lectures:** Marine riser components and design	6	D13.1
5	**Lectures:** Deepwater well control challenges and calculation	8	D13.1
6	**Lectures:** Subsea BOP configurations, components, and control system	8	D13.2
7	**Lectures :** Subsea production equipment and subsea tree types	6	D13.2
8	Midterm		A1.1 / D13.1 / D13.2
9	**Lectures**: Subsea electrical, chemical, and hydraulic control distribution units	8	A1.1D14.1
10	**Lectures :** Well testing aspects of subsea wells	6	A1.1,D14.1
11	**Lectures :** Subsea workover and well intervention operations	6	A1.1,D20.1
12	**Lectures :** General Revision	6,8	A1.1,D13.1,D13.2,D14.1 D20.1

Course: Subsea Technology	
Program LO’s	**Course LO’s**
A.1 Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1 Define and understand special drilling equipment used in deep-water drilling such as pipe transfer systems and handling devices, motion compensation systems of floating units, guideline tension and riser systems, temporary and permanent guide bases, diverters, and BOP assembly.
D.13 Analyze geological data, interpret well-logs, estimate hydrocarbon reserves and evaluate reservoir performance by applying the :principles and basic concepts of geology, geophysics, and reservoir engineering.	D.13.1 Design and analyze the riser system, mud gradient, pressure rating of equipment.
	D.13.2 Prepare engineering calculation and design including subsea riser equipment, well control and workover practical calculations.
D.14 Plan and construct oil wells, develop . oilfield production programs, design early surface facilities plants and field evacuation plans by applying the principles and basic concepts of drilling engineering, production fluid ،engineering, phase equilibrium mechanics and flow through porous media.	D.14.1 Evaluate calculation of subsea equipment design, calculation of well control , design of mud and drilling fluid program, design of marine riser components, testing analysis and data interpretation.
D.20 Create and/or re-design a process, component, or system, and carry out specialized engineering designs related to gas reservoir and well drilling and completion.	D20.1 Recommend programs and procedures of risk assessment management for different operations, quality control and assurance.

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date: 28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	Chemical Engineering Department		
Course Code	**NGP718 (Under balanced Drilling and Completions)**		
Year/ Level	4th Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
6	Act professionally in design and supervision of subsea technologies and their application in drilling and production
8	Use the modern technologies and material safety data sheets while designing and handling natural gas subsea and deep-water projects.

3. Learning Outcomes (LO's):

A1.1	Recognize engineering technologies as related to natural gas production and applications, pipeline network and transmission power systems.
D14.1	Analyze and interpret data related to well logs and testing, and design experiments to obtain new data.
D20.1	Recognize engineering technologies as related to natural gas production and applications, pipeline network and transmission power systems.

4. Course Contents:

No.	Topics	Week
1	Lectures: Air and gas, aerated, and stable foam drilling and completions operations.	1-2
2	Lectures: Development of basic calculational theory and application to operational problems.	3-4
3	Lectures: Emphasis on the planning of successful drilling and completions operations	5-6
4	Lectures: Selection of appropriate field equipment for drilling and completions operations.	7-8
5	Midterm	9
6	Lectures: Solution of drilling and completions field problems.	10-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	**X**	**X**	**X**											
D-Level	**D14.1**	**X**	**X**		**X**	**X**	**X**								
	D20.1	**X**	**X**		**X**	**X**	**X**								

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1/ D14.1 / D20.1
2	Practical Examination	-
3	Oral Examination	A1.1/D20.1
4	Formative (quizzes- online quizzes- presentation)	D14.1 /D20.1
5	Final Term Examination (written)	A1.1 / D14.1 /D20.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	-
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	35
4	Final Term Examination (written)	50
Total		100

8. List of References:

No.	Reference List
1	Lyons, B. Underbalanced Drilling: Limits and Extremes. Gulf Publishing Company (2012).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Lectures: Air and gas, aerated, and stable foam drilling and completions operations	6	A1.1
2	Lectures: Development of basic calculational theory and application to operational problems.	6	A1.1
3	Lectures: Emphasis on the planning of successful drilling and completions operations	6,8	D14.1 /D20.1
4	Lectures: Selection of appropriate field equipment for drilling and completions operations.	6,8	D14.1 /D20.1
5	Midterm		A1.1/ D14.1 / D20.1
6	Lectures: Solution of drilling and completions field problems.	6,8	D14.1 / D20.1

Course: Under balanced Drilling and Completions	
Program LO’s	**Course LO’s**
A.1 Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1 Recognize engineering technologies as related to natural gas production and applications, pipeline network and transmission power systems.
D.14 Plan and construct oil wells, develop oilfield production programs, design early surface facilities plants and field evacuation plans by applying the principles and basic concepts of drilling engineering, production engineering, phase equilibrium، fluid mechanics and flow through porous media .	D14.1 Analyze and interpret data related to well logs and testing, and design experiments to obtain new data.
D.20 Create and/or re-design a process, component, or system, and carry out specialized engineering designs related to gas reservoir and well drilling and completion.	D20.1 Design the preparation for drilling, rig selection and installation, the circulating system, the rotary system.

Course Coordinator: Dr. Hossam Mansour

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date: 28/3/2021

1. Basic Information:

Program Title	NGEP		
Department offering the Program	Chemical Engineering Department		
Department Responsible for the Course	NGEP		
Course Code	**NGP499**		
Year/ Level	4th Level		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	-	6	-

2. Course aims:

No.	Aim
3	Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.
5	Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages to deal with academic/professional challenges in a critical and creative manner.
7	Apply analytical, experimental, design, natural gas engineering processes with proficiency aided by modern engineering tools

3. Learning Outcomes (LO's):

A3.	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
A5.	Practice research techniques and methods of investigation as an inherent part of learning.
A6.	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.
A7.	Work efficiently as an individual and as a member of multi-disciplinary and multicultural teams.
A8.	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
A9.	Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
A10.	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.
D1.	Understand systems applicable to engineering by applying the concepts of: Thermodynamics, Fluid Mechanics, Heat and mass transfer, Material Properties, Measurements, and Mechanical Design.
D2.	Demonstrate knowledge, understanding, and utilization of plane and topographical surveying techniques, processes and equipment,

	photogrammetry, and the Global Positioning system (GPS) in engineering projects.
D3.	Use computational facilities and techniques, measuring instruments, workshops, and laboratory equipment to design experiments, collect, analyze, and interpret results.
D4.	Demonstrate additional abilities to select appropriate system, analyze, and design using the most up-to-date analytical tools, techniques, equipment, and software packages.
D6.	Prepare and present technical language and report writing.
D8.	Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.
D9.	Communicate knowledge and skills to engineering community and industry.
D10.	Incorporate economic, societal, environmental dimensions and risk management in design.
D13.	Analyze geological data, interpret well-logs, estimate hydrocarbon reserves and evaluate reservoir performance by applying the principles and basic concepts of geology, geophysics and reservoir engineering.
D14.	Plan and construct oil wells, develop oilfield production programs, design early surface facilities plants and field evacuation plans by applying the principles and basic concepts of drilling engineering, production engineering, phase equilibrium, fluid mechanics and flow through porous media.
D15.	Use specialist computer applications and mathematical models to maximize the performance of all-natural gas engineering stages.
D16.	Engage in the recent technological changes and emerging fields relevant to Natural gas engineering to respond to the challenging role and responsibilities of a professional Natural gas engineer.
D17.	Select appropriate solutions for engineering problems and enhanced gas recovery based on analytical thinking and select appropriate mathematical and computer-based methods for modeling and analyzing problems.
D18.	Evaluate and appraise designs, processes (operations), equipment and machinery, and propose improvements.
D19.	Analyze and interpret data related to well logs and testing, and design experiments to obtain new data.
D21.	Conduct troubleshooting in natural gas processing plants.
D22.	Combine between the engineering knowledge, understanding, and feedback to improve design, products and/or services in natural gas processing and applications.

5. Teaching and Learning Methods:

LO’s		Teaching and Learning Method													
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A3**					X			X	X	X	X			
	A5					X			X	X	X	X			
	A6					X			X	X	X	X			
	A7					X			X	X	X	X			
	A8				X	X			X	X	X	X			
	A9				X	X			X	X	X	X			
	A10				X	X			X	X	X	X			
D-Level	**D1**				X	X			X	X	X	X			
	D2								X	X				X	
	D3				X	X			X	X	X	X			
	D4				X	X			X	X	X	X			
	D6				X	X			X	X	X	X			
	D8				X	X			X	X	X	X			
	D9				X	X			X	X	X	X			
	D10				X	X			X	X	X	X			
	D13				X	X			X	X	X	X			
	D14				X	X			X	X	X	X			
	D15				X	X			X	X	X	X			
	D16				X	X			X	X	X	X			

	D17				**X**	**X**			**X**	**X**	**X**	**X**			
	D18				**X**	**X**		**X**						**X**	
	D19				**X**	**X**			**X**	**X**	**X**	**X**			
	D21				**X**	**X**			**X**	**X**	**X**	**X**			
	D22				**X**	**X**			**X**	**X**	**X**	**X**			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	**The course LOs would vary according to the specific research topic**
2	Practical Examination	
3	Oral Examination	
4	Formative (quizzes- online quizzes- presentation)	
5	Final Term Examination (written)	

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	-
2	Practical/ Oral Examination	-
3	Formative (quizzes- online quizzes- presentation –reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	
2	Practical/ Oral Examination	
3	Tutorials and Formative (quizzes- online quizzes- presentation – reports)	50
4	Final Term Examination (written)	50
Total		100

8. List of References

No.	Reference List
1	Design project statement prepared by supervisor
2	Design data and project objective set up by supervisor.
3	References relevant to the design problem

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

Program Coordinator: Prof. Dr. Mohamed Bassyouni

Date: 28/3/2021

21 Basic Information

Program Title	B. Sc. in Construction Engineering		
Department offering the Program	Civil Engineering		
Department Responsible for the Course	Civil Engineering		
Course Code	HUM 491 / Scientific thought		
Year / Level / Semester	Fourth Year (Senior II)		
Prerequisite	None		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

22 Course aims:

No.	**aim**
5	Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages skills of symptoms scientific thought to deal with academic/professional challenges in a critical and creative manner.

23 Learning Outcomes (LOs):

A5.1	Demonstrate an understanding of the effect of Symptoms Scientific Thought in Society.
A7.1	Identify the difference between Organization Globalism and particularity, Precision, Abstraction, Method and Observation.
A8.1	Understand Moral Elements in The Scientific Mind such as Critical Spirit, Impartiality, or Integrity Problems in solving engineering problems
A9.1	Use Moral Elements in The Scientific Mind to Lead and motivate individuals.

24 Course Contents:

No.	**Topics**	**Week**
1	**Lectures:** • Introduction about Symptoms Scientific Thought.	**1**
2	**Lectures:** • Vertical and Horizontal Recapitulation.	**2-3**
3	**Lectures:** • Organization and Globalism.	**4**
4	**Lectures:** • Particularity, Precision, Abstraction, and Method Observation	**5-6**
5	**Lectures:** • Hypothesis, Experimentation, Partial Rules	**7-8**
6	**Midterm**	**9**
7	**Lectures:**	**10-11**

	General Theory and Induction	
8	**Lectures:** • Moral Elements in The Scientific Mind: Impartiality	**12-13**
9	**Lectures:** • Moral Elements in The Scientific Mind: Integrity	**14**

25 Teaching and Learning Methods:

LO’s		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A5.1	x			x	x			x							
	A7.1	x			x	x		x								
	A8.1	x			x	x		x	x			x				
	A9.1	x			x	x		x	x			x				

26 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online/Offline lectures and assignments

27 Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A4.1, A6.1, D3.1, D8.1
2	Assignments and case studies	A3.1, A6.1, D3.1, D8.1, D10.1
3	Team project	A3.1, A4.1, A6.1, D10.1
4	Attendance and class participation	A3.1, A4.1, A6.1, D3.1, D8.1
5	Final Term Examination (written)	A3.1, A4.1, A6.1, D3.1, D8.1, D10.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Project	15
3	Formative (quizzes- online quizzes- presentation - …….)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Project	20
3	Formative (quizzes- online quizzes- presentation - …….)	10
4	Final Term Examination (written)	50
Total		100%

8. List of References

No.	Reference List
1	• Tversky, A.; Kahneman, D. (1981). "The framing of decisions and the psychology of choice". Science 211 (4481): 453–458. doi:10.1126/science.7455683
2	• 1957. Models of Man. John Wiley. Presents mathematical models of human behavior
3	• P.C.Chandrasekharan, Modern Scientific Thought Kindle Edition, 2018.
4	• F Sherwood Taylor, A Short History of Science and Scientific Thought, 1963.
5	• Broad C.D., Scientific Thought, 2003.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	**Lectures:** • Introduction about Symptoms Scientific Thought.	**5**	A3.1, A4.1, A6.1, D3.1
2	**Lectures:** • Vertical and Horizontal Recapitulation.	**5**	A3.1, A4.1, A6.1, D3.1, D10.1

3	**Lectures:** Organization and Globalism.	**5**	A3.1, A6.1, D3.1, D8.1, D10.1
4	**Lectures:** - Particularity, Precision, Abstraction, and Method Observation	**5**	A3.1, A4.1, A6.1, D3.1, D8.1, D10.1
5	**Lectures:** - Hypothesis, Experimentation, Partial Rules	**5**	A6.1, D3.1, D8.1, D10.1
6	- **Midterm**	**5**	A3.1, A4.1, A6.1, D3.1, D8.1, D10.1
7	**Lectures:** General Theory and Induction	**5**	A3.1, A4.1, A6.1, D3.1, D10.1
8	**Lectures:** - Moral Elements in The Scientific Mind: Impartiality	**5**	A3.1, A4.1, A6.1, D3.1, D8.1, D10.1
9	**Lectures:** - Moral Elements in The Scientific Mind: Integrity	**5**	A3.1, A4.1, A6.1, D3.1, D8.1, D10.1

Course: “Scientific thought-HUM 491”	
Program LOs	**Course Los**
A5. Practice research techniques and methods of investigation as an inherent part of learning.	**A5.1** Demonstrate an understanding of the effect of Symptoms Scientific Thought in Society.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	**A7.1** Identify the difference between Organization Globalism and particularity, Precision, Abstraction, Method and Observation.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	**A8.1** Understand Moral Elements in The Scientific Mind such as Critical Spirit, Impartiality or Integrity Problems in solving engineering problems.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	**A9.1** Use Moral Elements in The Scientific Mind to Lead and motivate individuals
D4. Demonstrate additional abilities to select appropriate system, analyze, and design using the most up-to-date analytical tools, techniques, equipment, and software packages.	**D4.1** Organize and manage time and resources effectively; for short-term and longer-term commitments.

Course Coordinator: Dr. /Rabab Abd Elkader

Program Coordinator: Assoc. Prof. /Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information

Program Title	B. Sc. in Construction Engineering		
Department offering the Program	Civil Engineering		
Department Responsible for the Course	Civil Engineering		
Course Code	HUM 492 /Management Science ll		
Year / Level / Semester	Fourth Year (Senior II)		
Prerequisite	Management Science I, Applied Statistics and Probability theory		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

2. Course aims:

No.	**aim**
5	Master self-learning and life -long learning strategies to communicate effectively using management science principals.
9	Lead, manage, and supervise a group to manage tasks, time, and resources in effective way.

3. Learning Outcomes (LOs):

A5.1	Identify the difference between major literary theories.
A7.1	Use Reading skills Lead and motivate individuals.
A8.1.	Work independently and within a team for class project and assignments.
D5.1	Effectively manage tasks, time, and resources

4. Course Contents:

No.	**Topics**	**Week**
1	**Lectures** • Management science principals	**1-2**
2	**Lectures** • Management terms and definitions	**3-4**
3	**Lectures** • Decision analysis techniques	**5-7**
4	**Lectures** • Risk assessment	**8**
8	• **Midterm**	**9**
9	**Lectures** • product liabilities technology	**10-11**
10	**Lectures** • Business ethics	**12-14**
1	**Lectures** • Management science principals	**1-2**

2	**Lectures** - Management terms and definitions	**3-4**
3	**Lectures** - Decision analysis techniques	**5-7**

5. Teaching and Learning Methods:

LO’s		**Teaching and Learning Method**														
		Lecture (Online/offline)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A5.1**	**x**			**x**	**x**			**x**				**x**			
	A7.1	**x**			**x**			**x**								
	A8.1	**x**			**x**			**x**								
	D5.1	**x**			**x**	**x**		**x**	**x**				**x**			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online/Offline lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A5.1, A7.1, A8.1, D5.1
3	Formative (quizzes- online quizzes- presentation.)	A5.1, A7.1, A8.1, D5.1
4	Final Term Examination (written)	A5.1, A7.1, A8.1, D5.1
1	Mid Term Examination (written/ online)	A5.1, A7.1, A8.1, D5.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks

1	Mid Term Examination (written/ online)	9
2	Project	15
3	Formative (quizzes- online quizzes-presentation.)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Project	15
3	Formative (quizzes- online quizzes-presentation.)	15
4	Final Term Examination (written)	50
Total		100%

8. List of References

No.	Reference List
1	David Anderson; Dennis J Sweeney; Thomas A Williams, An Introduction to Management Science, Mason, OH : Cengage, 2018.
2	Frederick S Hillier; Mark S Hillier; Karl Schmedders; Molly Stephens, Introduction to management science : a modeling and case studies approach with spreadsheets, New York, NY : McGraw-Hill Education, 2019
3	Jeffrey D. camm, & kipp Martin, An Introduction to Management Science, South-Western.
4	Bernard W Taylor, Introduction to management science, Harlow, United Kingdom : Pearson Education Limited, [2019]

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills

11. of the Course:

No.	Topics	aim	LO’s
1	**Lectures** • Management science principals	**5, 9**	A5.1, A7.1, A8.1, D5.1

2	**Lectures** - Management terms and definitions	**5, 9**	A5.1, A7.1, A8.1, D5.1
3	**Lectures** Decision analysis techniques	**5, 9**	A5.1, A7.1, A8.1, D5.1
4	**Lectures** - Risk assessment	**5, 9**	A5.1, A7.1, A8.1, D5.1
5	**Lectures** - Management science principals	**5, 9**	A5.1, A7.1, A8.1, D5.1
6	- **Midterm**	**5, 9**	A5.1, A7.1, A8.1, D5.1
7	**Lectures** product liabilities technology	**5, 9**	A5.1, A7.1, A8.1, D5.1
8	**Lectures** - business ethics	**5, 9**	A5.1, A7.1, A8.1, D5.1

Course: “Management Science ll- HUM 492”	
Program LOs	**Course Los**
A5. Practice research techniques and methods of investigation as an inherent part of learning.	**A5.1** Identify the difference between major literary theories.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	**A7.1** Use Reading skills Lead and motivate individuals..
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	**A8.1** Work independently and within a team for class project and assignments.
D.5. Demonstrate basic organizational and project management skills.	**D5.1** Effectively manage tasks, time, and resources

Course Coordinator: Dr. /Rabab Ragab

Program Coordinator: Assoc. Prof. /Mohamed Bassyouni

Approval Date: 28 / 3 / 2021

1. Basic Information

Program Title	B. Sc. in Construction Engineering		
Department offering the Program	Civil Engineering		
Department Responsible for the Course	Civil Engineering		
Course Code	HUM493/ Leadership in Groups & Organizations		
Year / Level / Semester	Fourth Year (Senior II)		
Prerequisite	None		
Specialization	Minor		
Teaching Hours / Bylaw 2012	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

2. Course aims:

No.	**aim**
3	Work in and lead a heterogeneous team and display leadership qualities and examine the essence of leadership skills, specifically; the personal, interpersonal, group and contextual factors which affect formal and emergent leadership in groups and organizations.

3. Learning Outcomes (LOs):

A6-1	Identify leader and manager skills and values.
A6-2	Distinguish between different leadership theories (limitations and characteristics)
A6-3	Describe five key elements of leadership.
A7-1	Discuss the advantages and disadvantages of working in teams
A7-2	Improve skills related to working in groups and teamwork through class activities and project.
A7-3	Discuss the role of strategic leadership in the strategic management process.
A8-1	Analyze leadership case studies.
A8-2	Prepare reports in accordance with the standard scientific guidelines for given topics.
A8-3	Present reports discussing the results and defending his/her ideas.
A9-1	Recommend methods to improve leadership skills in given case studies.
A9-2	Evaluate information through individual and group project work
D5-1	Define the ten managerial roles based on their three categories.
D5-2	Practice decision making based on leadership theories in class activities and project.

4. Course Contents:

No.	Topics	Week
1	Introduction (leadership definition)	**1-2**
2	Leader vs Manager	**3-4**
3	Power the key to leadership	**5-7**
4	Empowerment gains and threats	**8**
5	Leadership theories and models	**9**
6	Domains of leadership strengths	**10-11**
7	The five practices and ten commitments of exemplary leadership	**12-13**
8	Group projects presentation	**14**

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (Online/offline)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A6-1	X			X	X			X							
	A6-2	X			X	X			X							
	A6-3	X			X	X			X							
	A7-1	X			X	X			X							
	A7-2	X			X	X			X							
	A7-3	X			X	X			X							
	A8-1	X			X	X			X	X			X			
	A8-2	X			X	X			X	X			X			
	A8-3	X			X	X			X	X			X			
	A9-1	X			X	X			X	X			X			
	A9-2	X			X	X			X	X			X			
D-Level	D5-1	X			X	X			X	X			X			
	D5-2	X			X	X			X	X			X			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online/Offline lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A6-1, A6-2, A6-3, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, D5-1, D5-2
2	Group project presentation and discussion	A6-1, A6-2, A6-3, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, D5-1, D5-2
3	Formative (quizzes- online quizzes-presentation).	A6-1, A6-2, A6-3, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, D5-1, D5-2
4	Final Term Examination (written)	A6-1, A6-2, A6-3, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, D5-1, D5-2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Group project presentation and discussion	15
3	Formative (quizzes- online quizzes-presentation).	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Group project presentation and discussion	15
3	Formative (quizzes- online quizzes-presentation).	15
4	Final Term Examination (written)	50
Total		100%

8. List of References

No.	Reference List
1	James Kouzes, and Barry Posner, "The Leadership Challenge", Wiley, 6th edition, 2017, ISBN:0470651725.
2	Gareth Jones, and Jennifer George, "Contemporary Management", McGraw Hill, 11th edition 2017.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	aim	LO's
1	• Introduction (leadership definition)	**3**	A6-1
2	• Leader vs Manager	**3**	A6-1, A7-1, A7-2
3	• Power the key to leadership	**3**	A6-3, A7-2, A7-3, A9-1,
4	• Empowerment gains and threats	**3**	A6-3, A7-3, A8-1
5	• Leadership theories and models	**3**	A6-2, A8-1, D5-2
6	• Domains of leadership strengths	**3**	A7-2, A8-1, A9-1, D5-2
7	• The five practices and ten commitments of exemplary leadership	**3**	A6-3, D5-1, D5-2
8	• Group projects presentation	**3**	A6-1, A6-2, A6-3, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, D5-1, D5-2

Course: "Leadership in Groups & Organizations - HUM 493"	
Program LOs	**Course Los**
A6- Plan, supervise and monitor implementation of engineering projects.	A6-1 Identify leader and manager skills and values.
	A6-2 Distinguish between different leadership theories (limitations and characteristics)
	A6-3 Describe five key elements of leadership.
A7- Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	A7-1 Discuss the advantages and disadvantages of working in teams
	A7-2 Improve skills related to working in groups and teamwork through class activities and project.

	A7-3 Discuss the role of strategic leadership in the strategic management process.
A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Analyze leadership case studies.
	A8-2 Prepare reports in accordance with the standard scientific guidelines for given topics.
	A8-3 Present reports discussing the results and defending his/her ideas.
A9- Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9-1 Recommend methods to improve leadership skills in given case studies.
	A9-2 Evaluate information through individual and group project work
D5- Demonstrate basic organizational and project management skills.	D5-1 Define the ten managerial roles based on their three categories.
	D5-2 Practice decision making based on leadership theories in class activities and group project.

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