2023- 2024

Civil Engineering Program Specification

Contents

Civil Engineering
B.Sc. Program Specification

1.	Basic Information		
	1.1	Program Title	Civil Engineering
	1.2	Program Type	Single
	1.3	Department (s)	Civil Engineering
	1.4	Coordinator	Prof. Dr. Mohamed Elkiki
	1.5	External Evaluator(s)	8/2023
	1.6	Last Date of Program Specifications Approval	10/2023
	1.7	Year of starting the program	2007

2.	Professional Information	
	2.1	**Program Vision**
		The department works to become a distinguished school that presents civil engineers with high technical competencies and encourages advanced research to meet current and future challenges in the fields of civil engineering and local, regional and international excellence.
	2.2	**Program Mission**
		Offering advanced bachelor's programs in civil engineering to inculcate moral and ethical values of community service while developing skills to add value to the competencies of graduates. Transferring knowledge and activities to students with an emphasis on developing leadership qualities and teamwork. Providing infrastructure events and resources that contribute to a student-friendly learning environment. Providing a knowledge base and advisory services to the community in all fields of civil engineering. Encouraging students to pursue continuous learning and development to take professional competitive exams with the required training, to meet the needs of the labor market at the local, regional and international levels.

3.	Graduate Attributes
The graduates of the civil engineering program should be having the following attributes:	
1	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.
3	Behave professionally and adhere to engineering ethics and standards.
4	Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.

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.
7	Use techniques, skills and modern engineering tools necessary for engineering practice.
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.
10	Demonstrate leadership qualities, business administration and entrepreneurial skills.

4.	**Program aims**
The graduates of the Civil engineering program should be able to:	
1	Apply a broad range of engineering knowledge, science and specialized skills with analytic, systemic and critical thinking to identify and solve engineering problems in real life.
2	Lead, supervise, manage and work in a diverse team of professionals from various engineering disciplines, taking responsibility for own and team performance to achieve society's requirements of occupational safety, health, and quality standards.
3	Recognize the role in promoting engineering and contributing to the profession's and community's development and appreciating the importance of the environment.
4	Use the techniques, skills, and current engineering tools required for engineering practice by taking full responsibility for one's own learning and development of the ability to pursue postgraduate.
5	Communicate effectively with a variety of audiences using a variety of forms, methods, and languages.
6	Analyze data from the intended tests to manage resources creatively.
7	Achieve an optimum professionally in design and supervision of civil engineering projects and use the codes of practice of all civil engineering branches.
8	Apply analytical, experimental, design, construction engineering processes with proficiency aided by modern engineering tools.
9	Work to develop the profession and the community and promote sustainability principles and behave professionally and adhere to engineering ethics and standards.

10	Select the appropriate construction and building materials professionally and effectively and sustainable technologies for construction of buildings.

5.	**Competency**	**LOS**
Achievement of the following Program Outcomes would indicate that the graduates are equipped with the necessary knowledge and skills to achieve the Educational Objectives.		
C1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	**a1** Describe the relevant mathematical principles and theories in the discipline. **a2** Explain the scientific principles and theories that apply to the topic. **a3** Explain the basic principles of engineering. **b1** Using math ideas and theories that are applicable to the field. **b2** Using scientific concepts and theories that are relevant to the profession. **b3** Applying engineering basics that are relevant to the subject. **c1** Identify, formulate, and solve complex engineering problems by -applying the concepts and the theories of mathematics. **c2** Identify, formulate, and solve complex engineering problems by applying the concepts and the theories of sciences, appropriate to the discipline. **c3** Identify, formulate, and solve complex engineering problems by applying engineering fundamentals.
C2	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.	**a1** Define, basic characteristics, properties, concepts, and techniques of structural analysis and mechanics, properties and strength of materials, surveying, soil mechanics, hydrology and fluid mechanics. **a2** Define the principles, basic properties, and features of construction material, as well as their use in sustainable technologies for construction of buildings, infrastructures, and water structures. **b1** Conduct basic experiments to learn about the basic characteristics and features of structural analysis and mechanics, properties and strength of materials, surveying, soil mechanics, hydrology, and fluid mechanics. **b2** Conduct basic experiments to learn about the applications of structural analysis and mechanics, properties and strength of materials, surveying, soil mechanics, hydrology, and fluid mechanics in the fields of transportation and traffic, roadways and airports, railways, sanitary works, irrigation, water

		resources and harbors, or any other emerging field relevant to the discipline. **b3** Analyze and interpret data. **b4** Evaluate components, systems, and processes are evaluated for their characteristics and performance. **c1** Choose relevant mathematical and computer-based methodologies for problem modelling and analysis. **c2** Develop suitable experimentation and/or simulation. **c3** Applying statistical analyses and objective engineering judgment to draw conclusions.
C3	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.	**a1** Learn the general principles of design techniques specific to reinforced concrete and steel structures, foundations and earth retaining structures. **a2** Understand the professional ethics and impacts of engineering solutions on society and environment. **a3** Recognizes the various construction defects, instability and quality issues and assess environmental impacts of projects. **b1** Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact. **c1** Incorporate economic, societal, global, environmental, and risk management factors into design. **c2** Applying engineering design procedures to generate cost-effective solutions while adhering to the principles and contexts of sustainable design and development.
C4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	**a1** Describe quality assurance systems, codes of practice, and standards, as well as health and safety regulations and environmental concerns. **a2** List the engineering-related business and management principles. **a3** Define contemporary engineering technologies and their applications in relation to disciplines. **b1** Create methodical approaches when dealing with new and advancing technology**.** **c1** Apply safe systems at work by taking the necessary precautions to manage hazards. **c2** Use fundamental organizational and project management abilities. **c3** Utilize modern technologies**.** **c4** Apply quality assurance procedures and follow codes and standards.

C5	Practice research techniques and methods of investigation as an inherent part of learning.	**a1** Define technical language and report writing. **b1** Assess different ideas, views, and knowledge from a range of sources. **c1** Prepare technical reports. **d1** Search for information to engage in lifelong self-learning discipline.
C6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	**a1** Show the appropriate and sustainable technologies for construction of buildings, infrastructures and water structures. **b1** interpret data derived from laboratory observation from equipment flow sheets, charts, and curves to interpret data derived from laboratory observation. **c1** Conduct experimental work related to the reinforced concrete and steel structures, foundations and earth retaining structures. **c2** Acquire entrepreneurial skills.
C7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	**d1** Collaborate effectively within multidisciplinary team. **d2** Work in stressful environment and within constraints. **d3** Motivate individuals**.**
C8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	**d1** Communicate effectively. **d2** Demonstrate efficient IT capabilities.
C9	Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	**d1**Think creatively in solving problems of design. **d2** Effectively manage tasks, time, and resources. **d3** Refer to relevant literature**.**
C10	Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.	**d1** Search for information to engage in lifelong self-learning discipline. **d2** Professionally merge engineering knowledge, understanding, and feedback to improve design, products and/or services.
C11	Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of structural analysis and mechanics, properties and strength of materials, surveying, soil mechanics, hydrology and fluid mechanics.	**a1.** Recognize the fundamentals of structural analysis and mechanics, properties and strength of materials, surveying, soil mechanics, hydrology, and fluid mechanics. **a2.** Summarize appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures. **c1** Using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of structural analysis and mechanics, properties and

		strength of materials, surveying, soil mechanics, hydrology, and fluid mechanics.
C12	Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; and at least three of the following civil engineering topics: Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbors; or any other emerging field relevant to the discipline.	**b1** Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures. **b2** Achieve an optimum design of works for transportation and traffic, roadways and airports, railways, sanitary works, irrigation, water resources and harbors; or any other emerging field relevant to the discipline.
C13	Plan and manage construction processes; address construction defects, instability, and quality issues; maintain safety measures in construction and materials; and assess environmental impacts of projects.	**a1** defines plan and mange construction process. **b1** Address construction defects, instability, and quality issues **c1** Assess environmental impacts of projects.
C14	Deal with biddings, contracts and financial issues including project insurance and guarantees.	**a1** define biddings, contracts, and financial issues. **b1** Address biddings, contracts and financial issues including project insurance and guarantees. **c1** Apply biddings, contracts, and financial issues on civil engineering projects

6. Academic Standards

The program adopts the National Academic reference standards of Civil engineering program (NARS) which is approved by the national authority for quality assurance and accreditation of education NAQAAE.

7. Reference Standards

External references for standards (Benchmarks)
ABET Engineering Criteria 2000
University of Texas at Austin, College of Engineering, Dept. of CIVIL Engineering
Iowa State University, CIVIL Engineering Dept.
Kuwait University, College of Engineering and Petroleum, Civil Engineering Department.

8. Program Curriculum Structure and Contents

8.1 Program Duration:

The program duration is five years.

8.2 Program Structure:

- **Total units of the program:** 180 units
- **Compulsory**:162 units

- **Elective**: 18 units

Subject Area		%	Tolerance
A	Humanities and Social Sciences	% 9.44	9-12
B	Mathematics and Basic Sciences	%21.11	20-26
C	Basic Engineering Sciences	% 21.71	20-23
D	Applied Engineering and Design	%21.66	20-22
E	Computer Application and ICT	% 8.3	9-11
F	Project and Practice	%7.78	6-8
Subtotal		**%90**	**92-94**
G	Discretionary (Institution character – Identifying) Subjects	%10	8-10
Total		**%100**	**100%**

8.3 Program Courses

A. Humanities and Social Sciences		
Code	**Course Name**	**No. of Units**
LNG101	Technical English Language (1)	2
LNG201	Technical English Language (2)	2
ENG303	Engineering Economy	3
ENG401	Environmental Management	2
ENG106	Int. to Engineering and Environment	2
ENG207	Technical Report Writing	2
CIE503	Legal, Professional, and Social Aspects of Engineering	2
ENG402	Project Management and Control	2
Total	**9.4%**	**17**

B. Mathematics and Basic Science		
Code	**Course Name**	**No. of Units**
MTH101	Mathematics (1)	3
MTH102	Mathematics (2)	3
MTH201	Mathematics (3)	3
MTH202	Mathematics (4)	3
MTH301	Engineering Probability and Statistics	3
ENG101	Mechanics (1)	3
ENG102	Mechanics (2)	3
CHE101	General Chemistry	3
ENG105	Production Engineering	3
PHY101	Physics (1)	4
PHY102	Physics (2)	4
MTH302	Numerical Methods in Engineering	3
Total	**21.11%**	**38**

C. Basic Engineering Science		
Code	**Course Name**	**No. of Units**
ENG103	Engineering Drawing and Projection	3
ENG202	Engineering Thermodynamics	4

ENG208	Electrical Engineering Fundamentals	3
ENG301	Fluid Mechanics	3
CIE203	Structure Analysis (1)	3
CIE301	Structure Analysis (2)	4
CIE304	Structure Analysis (3)	3
CIE202	Surveying (1)	2
CIE307	Surveying (2)	2
CIE308	Traffic & Transportation Engineering	3
CIE201	Civil Engineering Drawing	3
ENG205	Strengthen of Materials	3
CIE302	Properties and Strength of Materials	2
CIE306	Reinforced Concrete (1)	4
Total	**% 21.71**	**42**

D. Applied Engineering and Design		
Code	**Course Name**	**No. of Units**
CIE303	Principles of Building Construction	2
CIE305	Hydrology and Irrigation Engineering	3
CIE402	Steel Structures Design (1)	4
CIE407	Steel Structures Design (2)	4
CIE406	Water Supply and Sanitary Engineering	3
CIE501	Soil Mechanics and Foundation	3
CIE502	Highways and Airport Engineering	3
CIE504	Design of Irrigation Works	3
CIE505	Foundation Engineering (1)	3
CIE506	Inland Navigation and Harbor Engineering	3
CIE403	Reinforced Concrete (2)	4
CIE408	Reinforced Concrete (3)	4
Total	**21.66%**	**39**

E. Computer Application and ICT		
Code	**Course Name**	**No. of Units**
ENG104	Int. to Computer Systems	2
ENG201	Computer Programming	3
ENG206	Int. to Information Technology	3
CIE405	Computer Applications in Civil Engineering	3
CIE201	Civil Engineering Drawing	2
ENG 103	Engineering Drawing and Projection	2
Total	**% 8.3**	**15**

F. Project and Practice		
Code	**Course Name**	**No. of Units**
CIE202	Surveying (1)	3
CIE307	Surveying (2)	3
CIE302	Properties and Strength of Materials	3

CIE404	Geology and Soil Mechanics	3
CIE401	Open Channels Hydraulics	3
CEE509	Project (1)	3
CEE510	Project (2)	3
Total	**% 7.78**	**21**

G. Discretionary (Institution Character – Identifying) Subjects		
Code	**Course Name**	**No. of Units**
6 Elective Courses		
Total	**10%**	**18**

9.Curriculum Structure and Contents

Compulsory Courses

Level	Semester	Code	Course Name	Pre-Request	Units	Hours / Week			Competencies	Program LOs
						Lect.	Lab.	Exer.		
LEVEL 1	SEMESTER 1	MTH101	Mathematics (1)	-	3	2	-	2	C1	a1, a3, b1
		ENG101	Mechanics (1)	-	3	2	-	2	C1	a1, a2, b1
		PHY101	Physics (1)	-	4	2	2	2	C1 C2 C6	a1, a2, b1 a2 c1
		CHE101	General Chemistry	-	3	2	2	-	C1 C2 C3 C6 C10	a1, c2, c3 a2 d1, d2 c1 d2
		ENG103	Engineering Drawing and Projection	-	3	1	-	4	C1	a1, a2, b1, b2
		ENG104	Int. to Computer Systems	-	2	1	2	-	C1 C5	c2, c3 b1
		Total			**18**	**11**	**10**	**6**		
	SEMESTER 2	MTH102	Mathematics (2)	-	3	2	-	2	C1	a1, a3, b1, b3
		ENG102	Mechanics (2)	-	3	2	-	2	C1	a1, a2, b1, c1
		PHY102	Physics (2)	-	4	2	2	2	C1 C2 C6	a1, a2, a3, b2 a2 c1

Compulsory Courses										
Level	Semester	Code	Course Name	Pre-Request	Units	Hours / Week			Competencies	Program LOs
						Lect.	Lab.	Exer.		
		ENG105	Production Engineering	-	3	2	2	-	C1 C3 C6	a1, a3, b3 c1, c2 a1, c2
		ENG106	Int. to Engineering and Environment	-	2	2	-	-	C1 C3	a2, a3, b2, c3 a2, a3, b1, c1
		LNG101	Technical English Language (1)	-	2	1	-	2	C8	d1
		Total			**17**	**12**	**4**	**7**		
LEVEL 2	SEMESTER 1	MTH201	Mathematics (3)	MTH101	3	2	-	2	C1	a1, a2, a3, b1
		CIE201	Civil Engineering Drawing	ENG105	3	1	-	4	C1 C11 C12	a2, a3 c1 b1
		CIE202	Structure Analysis (1)	ENG101	3	2	-	2	C1 C2 C11	a3, b3, c3 a1, c3 a1, c1
		ENG201	Computer Programming	-	3	1	2	-	C1 C2	b3, c1, c2 a1, b3, c1
		ENG202	Engineering Thermodynamics	ENG102	4	3	-	2	C1	a1, a2, a3, b1, b2, c1, c2
		LNG201	Technical English Language (2)	LNG101	2	2	2	-	C5 C8 C10	a1 d1, d2 d1, d2
		Total			**18**	**12**	**2**	**11**		
	SEMESTER 2	MTH202	Mathematics (4)	-	3	2	-	2	C1	a1, a2, a3, b1, c1
		CIE203	Surveying (1)	-	3	2	1	1	C1 C2 C11	a2, b1 b1 a1, c1
		CIE301	Structure Analysis (2)	CIE202	4	3	-	2	C1 C2 C11	a1, b3 a1 a1
		ENG205	Strengthen of Materials	ENG101	3	2	1	1	C1	a1, b1, c2, c3

Compulsory Courses										
Level	Semester	Code	Course Name	Pre-Request	Units	Hours / Week			Competencies	Program LOs
						Lect.	Lab.	Exer.		
		ENG206	Int. to Information Technology	-	3	2	2	-	C4 C8	a2, a3, c3 d1, d2
		ENG208	Electrical Engineering	-	3	2	-	2	C1 C2	a1, c1, c2 b3
		Total			**19**	**13**	**4**	**8**		
LEVEL 3	SEMESTER 1	MTH301	Engineering Probability and Statistics	MTH102	3	2	-	2	C1	a1, a2, b1, b3, c2
		CIE302	Properties and Strengthen of Materials	-	3	2	1	1	C1 C2 C4 C11	b2 a2, b1, b3 a1, a3, c4 a1, a2
		CIE303	Principles of Building Constructions	-	2	1	-	2	C2 C4 C11	a2 a1, a2, a3, c4 a2
		CIE304	Structure Analysis (3)	CIE202	3	2	-	2	C1 C2 C11	a3, b3, c2, c3 a1, c3 a1, c1
		ENG301	Fluid Mechanics	ENG102	3	2	1	1	C1 C2	a1, a2, b1, b2, b3 a1, a2, b1
		ENG303	Engineering Economy	-	3	2	-	2	C3 C4	a1, a2, b1, c1 a2, b1, c2
		Total			**17**	**11**	**2**	**10**		
	SEMESTER 2	MTH302	Numerical Methods in Engineering	-	3	2	-	2	C1	a1, a2, b1, b2, c1, c2
		CIE305	Hydrology and Irrigation Engineering	ENG301	3	2	-	2	C1 C2 C11 C12	a2, a3, b1, b2 a1, b1, b2 a1, c1 b2
		CIE306	Reinforced Concrete (1)	ENG205	4	3	-	2	C1 C2	a3, c2 a2, c3

Compulsory Courses										
Level	Semester	Code	Course Name	Pre-Request	Units	Hours / Week			Competencies	Program LOs
						Lect.	Lab.	Exer.		
									C4 C11 C12	a1 c1 b1
		CIE307	Surveying (2)	CIE203	3	2	1	1	C1 C11	a2, b1 a1, c1
		CIE308	Traffic and Transportation Engineering	-	3	2	-	2	C1 C2 C11 C12	c2 a2, b2, b3, c3 a2 b2
		ENG207	Technical Report Writing	-	2	2	-	1	C5 C8	a1, b1, c1, d1 d1, d2
		Total			**18**	**13**	**1**	**10**		
		CIE401	Open Channel Hydraulics	ENG301	3	2	1	1	C2 C12	a2, c2 b1, b2
	SEMESTER 1	CIE402	Steel Structure Design (1)	CIE202	4	3	-	2	C1 C2 C9 C11 C12	a3. b3, c3 a1, c3 d3 a1, c1 b1
		CIE403	Reinforced Concrete (2)	CIE306	4	3	-	2	C2 C9 C12	a2, c3 d1, d3 b1
		CIE404	Geology and Soil Mechanics (1)	-	3	2	1	1	C1 C2 C6 C11	a3, b3, c3 a1, b1 b1, c1 a1, c1
		ENG402	Project Management and Control	-	2	1	-	2	C3 C9 C13 C14	b1, c2 d2 a1 a1, b1, c1
		CIE4xx	Elective Course (1)	Complete 100 hrs.	3	2	-	2	-	
		Total			**19**	**13**	**2**	**10**		
	SEMEST	CIE405	Computer Application in Civil Engineering	ENG201	3	2	2	-	C2 C11	a1, c1 c1

Compulsory Courses										
Level	Semester	Code	Course Name	Pre-Request	Units	Hours / Week			Competencies	Program LOs
						Lect.	Lab.	Exer.		
		CIE406	Water Supply and Sanitary Engineering	ENG301	3	2	-	2	C1 C10 C11 C12	a3, b2 d1 a2 b2
		CIE407	Steel Structure Design (2)	CIE402	4	3	-	2	C1 C2 C5 C11 C12	a3, b3 a1 d1 a1, c1 b1
		CIE408	Reinforced Concrete (3)	CIE403	4	3	-	2	C2 C11 C12	a2, b1, c3 a1, a2 b1
		ENG401	Environmental Management	-	2	2	-	-	C3 C4 C10	a2, a3, b1, c1 a1, c1, c3 d1
		CIE4xx	Elective Course (2)	Complete 100 hrs.	3	2	-	2	-	
		Total			**19**	**13**	**2**	**10**		
LEVEL 5	SEMESTER 1	CIE501	Soil Mechanics and Foundation	CIE404	3	2	-	2	C1 C2 C10 C11 C12	a1, a2, a3, b2 a2, b3 d1, d2 a1, a2 b2
		CIE502	Highways and Airport Engineering	CIE308	3	2	-	2	C2 C3 C6 C11 C12	a2, b2, b3 a1, a3, b1 a1 a2 b2
		CIE503	Legal, Professional, and Social Aspects of Engineering	-	2	2	-	2	C2 C4 C14	a2, b1 b1 a1

Compulsory Courses										
Level	Semester	Code	Course Name	Pre-Request	Units	Hours / Week			Competencies	Program LOs
						Lect.	Lab.	Exer.		
		CIE509	Project (1)	Complete 140 hrs.	3	2	2	-	C2 C3 C4 C5 C7 C8 C11 C12 C13 C14	a1, a2, b1, b2, b3, b4, c1, c2, c3 a1, a2, a3, b1 a1, a3, c2, c3 b1, c1, d1 d1, d2, d3 d1, d2 a1, a2, c1 b1, b2 a1, b1, c1 a1, b1, c1
		CIE5xx	Elective Course (3)	Complete 100 hrs.	3	2	-	2	-	
		CIE5xx	Elective Course (4)	Complete 100 hrs.	3	2	-	2	-	
		Total			**17**	**12**	**2**	**10**		
	SEMESTER 2	CIE504	Design of Irrigation Works	CIE401	3	2	-	2	C3 C11 C12	a1, b1 a2 b1, b2
		CIE505	Foundation Engineering (1)	CIE501	3	2	-	2	C1 C2 C4 C9 C12	a1, a2, a3, b1, b2, b3, c1, c2, c3 a1, a2 a1 d3 b1
		CIE506	Inland Navigation and Harbor Engineering	ENG301	3	2	-	2	C1 C2 C3 C4 C5 C6 C11 C12 C13	c1 b3 a1 a1 d1 a1 a1, a2, c1 b1, b2 c1

Compulsory Courses										
Level	Semester	Code	Course Name	Pre-Request	Units	Hours / Week			Competencies	Program LOs
						Lect.	Lab.	Exer.		
		CEE510	Project (2)	CIE509	3	1	-	4	C2 C3 C4 C5 C7 C8 C11 C12 C13 C14	a1, a2, b1, b2, b3, b4, c1, c2, c3 a1, a2, a3, b1 a1, a3, c2, c3 b1, c1, d1 d1, d2, d3 d1, d2 a1, a2, c1 b1, b2 a1, b1, c1 a1, b1, c1
		CIE5xx	Elective Course (5)	Complete 100 hrs.	3	2	-	2	-	
		CIE5xx	Elective Course (6)	Complete 100 hrs.	3	2	-	2	-	
		Total			**18**	**11**	**-**	**14**		

Elective Courses (Level 41x)

Elective Courses								
Code	Course Name	Units	Pre-Request	Hours / Week			Competencies	Program LOs
				Lect.	Lab.	Exer.		
CIE411	Construction Estimating and Tendering	3	Complete 100 hrs.	2	-	2	C9 C13 C14	d2 a1 a1, b1, c1
CIE414	Productivity Enhancement Method	3	Complete 100 hrs.	2	-	2	C3 C4 C7 C9	b1 b1, c1, c3 d1, d2, d3 d2
CIE415	Quality Assurance and Engineering Reliability	3	Complete 100 hrs.	2	-	2	C3 C4 C13	a3, b1 a1, c4 b1
CIE416	Quality Control	3	Complete 100 hrs.	2	-	2	C3 C4 C13	a3, b1 a1, c4 b1
CIE417	Reliability of Structures	3	Complete 100 hrs.	2	-	2	C3 C4 C12	a1, a2, c1 a1, c1 b1

Elective Courses								
Code	Course Name	Units	Pre-Request	Hours / Week			Competencies	Program LOs
				Lect.	Lab.	Exer.		
CIE418	Risk Management and Constructions Safety	3	Complete 100 hrs.	2	-	2	C3 C4	a3, b1, c1 a1, c1, c4

Elective Courses								
Code	Course Name	Units	Pre-Request	Hours per week			Competencies	Program LOs
				Lect.	Lab.	Exer.		
CIE412	Air Conditioning Systems for Building	3	Complete 100 hrs.	2	-	2	C2 C3 C4 C13	b1 b1 a3 b1, c1
CIE413	Design of Lightning Systems for Building	3	Complete 100 hrs.	2	-	2	C2 C3 C6 C13	c1 c2 c2 a1

Elective Courses (Level 5xx)

Elective Courses								
Code	Course Name	Units	Pre-Request	Hours per week			Competencies	Program LOs
				Lect.	Lab.	Exer.		
CIE511	Bridge Engineering	3	Complete 100 hrs.	2	-	2	C2 C9 C12	a1, b3 d1 b1
CIE513	Concrete Structures Technology	3	Complete 100 hrs.	2	-	2	C2 C4 C11	a2 a1, a3 a1, a2
CIE516	Design of Earthquake Structures	3	Complete 100 hrs.	2	-	2	C6 C11 C12	a1 a1, a2 b1
CIE519	Design of Shell Structures	3	Complete 100 hrs.	2	-	2	C2 C9 C12	a1 d1 b1
CIE522	Fiber Reinforced Cement Composites	3	Complete 100 hrs.	2	-	2	C2 C4 C11	a2 a1, a3, b1 a1, a2

Elective Courses								
Code	Course Name	Units	Pre-Request	Hours per week			Competencies	Program LOs
				Lect.	Lab.	Exer.		
CIE525	Modern Structure Materials	3	Complete 100 hrs.	2	-	2	C2 C4 C11	a2, c2 a1, a3, b1 a1, a2
CIE529	Planning of Buildings Maintenance and Protection	3	Complete 100 hrs.	2	-	2	C2 C4 C13	b4 c1 b1, c1
CIE530	Prefabricated Concrete Frames	3	Complete 100 hrs.	2	-	2	C2 C4 C11	a2 a1, a3 a1, a2
CIE539	Reinforced Concrete (4)	3	Complete 100 hrs.	2	-	2	C6 C11 C12	a1 a1, a2 b1
CIE542	Special Concrete Constructions (1)	3	Complete 100 hrs.	2	-	2	C2 C4 C6 C9 C12	a2, c3 b1 a1, c1 d1 b1
CIE543	Foundation Engineering (2)	3	Complete 100 hrs.	2	-	2	C1 C2 C3 C4 C12	a3, b3, c3 c2 c2 a1 b1
CIE544	Special Concrete Constructions (2)	3	Complete 100 hrs. CIE539	2	-	2	C2 C3 C4 C6 C9 C12	a2, c3 c2 c3 c1 d1 b1
CIE546	Reinforced Concrete (5)	3	Complete 100 hrs. CIE539	2	-	2	C2 C9 C12	a2, c3 d1 b1

Elective Courses								
Code	Course Name	Units	Pre-Request	Hours per week			Competencies	Program LOs
				Lect.	Lab.	Exer.		
CIE512	Coastal Engineering Fundamentals	3	Complete 100 hrs.	2	-	2	C2 C3 C4 C11 C12 C13	b4 a1 a1 a1, a2, c1 b1 c1

Elective Courses								
Code	Course Name	Units	Pre-Request	Hours per week			Competencies	Program LOs
				Lect.	Lab.	Exer.		
CIE517	Design of Marine Platforms	3	Complete 100 hrs.	2	-	2	C2 C3 C4 C6 C11 C12	b3 a1 a1 a1 a2 b1
CIE523	Groundwater Hydraulics	3	Complete 100 hrs.	2	-	2	C1 C12	a2, b1, b2 b1, b2
CIE526	Hydraulics Engineering	3	Complete 100 hrs.	2	-	2	C1 C11 C12	a1, a2 a2 b1, b2
CIE535	River Engineering	3	Complete 100 hrs.	2	-	2	C1 C11 C12	a1, a3 a1, a2, c1 b1, b2

Elective Courses								
Code	Course Name	Units	Pre-Request	Hours per week			Competencies	Program LOs
				Lect.	Lab.	Exer.		
CIE514	Construction Contraction	3	Complete 100 hrs.	2	-	2	C3 C9 C13 C14	b1, c2 d2 a1 a1, b1, c1
CIE515	Cost Analysis for Structure Projects	3	Complete 100 hrs.	2	-	2	C3 C5 C9 C13	b1, c1, c2 c1 d2 a1
CIE520	Engineering Project Evaluation	3	Complete 100 hrs.	2	-	2	C3 C4 C13	a3, b1, c1 a1, c2 a1, c1
CIE531	Project Decision Analysis	3	Complete 100 hrs.	2	-	2	C1 C2 C3 C4	c1, c2, c3 b3, b4, c1, c3 a2, b1 a2, c2
CIE532	Project Financial Management	3	Complete 100 hrs.	2	-	2	C3 C9 C13	b1, c1 d2 a1
CIE533	Project Management (2)	3	Complete 100 hrs.	2	-	2	C3 C7 C9 C13 C14	b1, c1, c2 d1, d2, d3 d2 a1 a1, b1, c1

Elective Courses								
Code	Course Name	Units	Pre-Request	Hours per week			Competencies	Program LOs
				Lect.	Lab.	Exer.		
CIE534	Project Visibility Study	3	Complete 100 hrs.	2	-	2	C3 C4	a2, b1, c2 a2, c2

Elective Courses								
Code	Course Name	Units	Pre-Request	Hours per week			Competencies	Program LOs
				Lect.	Lab.	Exer.		
CIE521	Environmental Pollution Control	3	Complete 100 hrs.	2	-	2	C1 C3 C12 C13	a3, b2 a2, a3, c1 b2 c1
CIE524	Highway Materials and Construction	3	Complete 100 hrs.	2	-	2	C1 C11 C12	a3, b2 a2 b2
CIE527	Pavement Design	3	Complete 100 hrs.	2	-	2	C4 C6 C11	a2 b1, c2 a1, a2
CIE538	Traffic Control Systems	3	Complete 100 hrs.	2	-	2	C1 C2 C11	a2, b3 b2, b4, c1 a2
CIE540	Tunneling and Underground Excavation	3	Complete 100 hrs.	2	-	2	C2 C4 C6 C9 C12	a2, c3 b1 a1 d1 b1
CIE541	Urban Transportation Planning	3	Complete 100 hrs.	2	-	2	C2 C3 C11 C12 C13	a2, b2 c1 a2 b1, b2 a1, c1
CIE545	Railway Engineering	3	Complete 100 hrs.	2	-	2	C1 C2 C12	a3, b2 b2 b2

Training

Code	Course Name	Units	Hours / Week	Competencies	LOs
ENG 430	Field Training 1	0	35 hours\week for at least 4 weeks	C3 C5 C6 C7 C9	a1, a2, a3, b1, c2 a1, b1, c1, d1 a1, c2 d1, d2, d3 d1, d2

ENG 530	Field Training 2	0	35 hours\week for at least 4 weeks	C3 C5 C6 C7 C9	a1, a2, a3, b1, c2 a1, b1, c1, d1 a1, c2 d1, d2, d3 d1, d2

10. Programme admission requirements

- **Admission to the preparatory year:**
  Having Egyptian Secondary education or equivalent certificate with major in Mathematics with the minimum grades determined by the National Admission Office.
- **Admission to the Civil Engineering Department:**
  At the end of the preparatory year, students should fill an application form to choose the program he/she wishes to join (in a priority sequence). The students are selected according to the total no. of grades attained by each student at the end of the preparatory year. The number of students is determined according to the availability of educational resources.

11. Regulations for progression and program completion

- **All Years (except the last year)**
  The student is considered successful if he passes the examinations in all courses

  of his class.

  - The student must get a minimum of 50% to pass each course.
  - To pass a level the student should not fail in more than two courses of his class or from lower classes.
- **Last Year**
  - To be graduated, the student must pass all the courses.
  - If the student fails in the project; he must repeat it during the next semester.
- **The Grades of Success:**
  The student achieves one of the following grades in the examinations results and in the general grade according to the marks achieved:
    - A: from 85% of the total mark and upwards.
    - B: from 75% to less than 85%of the total mark.
    - C: from 65% to less than 75%of the total mark.
    - D: from 50% to less than 65% of the total mark.

  The grades of a failing student in a course are estimated in one of' the following grades:

- F: less than 50%

Also, the student is failing in exam if he doesn't have at least 30% of final exam maximum grade.

12. Teaching and Learning Methods

1.	**Face-to-face lecture**	**8.**	**Projects**
2.	**On line Lecture**	**9.**	**Site visits**
3.	**Flipped Classroom**	**10.**	**Self-learning and research**
4.	**Presentation and Movies**	**11.**	**Cooperative**
5.	**Discussion**	**12.**	**Discovering**
6.	**Problem-solving**	**13.**	**Modeling**
7.	**Brain storming**	**14.**	**Lab**

Teaching and Learning Methods of Disable Students:

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

13. Methods and rules for student evaluation

Method (Tool)	LO's
Written exam	To assess knowledge and understanding intellectual skills.
Quizzes and reports	To assess knowledge and understanding & general and transferable skills.
Oral exams	To assess knowledge and understanding, intellectual, general, and transferable skill.
Practical	To assess knowledge and understanding, professional, general, and transferable skill.
Project applied on a practical field problem	To assess knowledge and understanding skills, intellectual skills, professional skills, general and transferable skill.

14. Program Evaluation

Evaluator	Tools	Sample evidence
1-Senior students	Questionnaires	15% of the students
2- Alumni	Questionnaires	
3- Stakeholders	Questionnaires	Samples representative from all sectors
4-external evaluator	Review reports	

15. A. Civil Engineering Courses

MTH 101	**Mathematics 1**	**(3 Credit)**

Prerequisite	**-**				
Content	**Algebra**: vectors algebra- partial fractions – equations theory – vectors – mathematical deduction – numerical solutions methods (simple repetitive method – Newton and modified Newton's method – intersection method – False position method – arrays – linear equations systems – Gauss Jordan method for deletion. **Derivation**: function (definition – theories) – basic trigonometric functions and its inverse – exponential and logarithmic functions – hyperbolic functions and its inverse – connection (definition – theories)- limits (definition – theories) - derivatives (definition – theories – higher order types) – curves drawing – mathematical and engineering derivative applications - undefined formulas - Taylor expansion – Mac Lorean expansion – approximation – introduction in partial derivation.				
Lecture	**2 hours/week**	**Laboratory**	**-**	**Tutorial**	**2hours /week**

MTH 102	**Mathematics 2**				**(3 Credit)**
Prerequisite	**-**				
Content	**Analytical geometry:** equations of second degree and double equation for two straight lines – movement and rotation of axes – groups of unified axes circles – conical sectors (properties of conical sectors - parabola – ellipse – hyperbola) – analytical geometry in space – Cartesian coordinates – cylindrical – spherical – plane in space – equations of surfaces in second order – rotation and movement of axes in space **Integration:** indefinite integration (basic functions – theories) – method of integration (direct – indirect) - definite integration (definition – properties - theories) – applications of definite integration (plain areas – circular volumes – plain technical length) – areas – circular surfaces – numerical integration.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2hours /week.**

MTH201	**Mathematics 3**				**(3 Credit)**
Prerequisite	**MTH 101**				
Content	**Partial differentiation applications**: maximum and minimum values in more than one variable – directional analysis - the directional differential effects - the multi-integrations and its applications (the curved and the orthogonal axis) – Gauss- Stokes theory - the endless series and function expansion – basic concepts for the convergence and divergence. **Ordinary differential equations:** The first order (the equations which can be separated, homogeneous, exact and linear) - the ordinary differential equations from the second order and higher orders (with constant and variable coefficients), systems from the ordinary differential equations– Laplace transfer and its applications in the solution of differential equations.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2hours / week.**

MTH202	**Mathematics 4**	**(3 Credit)**
Prerequisite	**MTH 101**	

Content	Special functions – Fourier series - periodic functions and Euler's laws – Fourier's integrations – solutions of the differential equations by series - solving the partial differential equations using variables separation. Functions with complex variables – complex quantities algebra– multiple values functions - the analytical functions and Koshi's theorem - the complex series – Taylor and Lorant series - the zeros, unique points and the rest - the infinite series.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2hours /week.**

MTH 301	**Engineering Probability and Statistics**				**(3 Credit)**
Prerequisite	-				
Content	Probability theory. Discrete and continuous probability distributions. Statistics in engineering. Descriptive Statistics Sampling distributions. Estimation and confidence intervals. Hypothesis testing. Simple regression.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2hours / week.**

MTH 302	**Numerical Methods in Engineering**				**(3 Credit)**
Prerequisite	-				
Content	Numerical solution of linear and nonlinear systems - Numerical differentiation and integration - Curve fitting and interpolation - Numerical solution of initial value problems - Boundary and Eigen value problems.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours /week.**

PHY 101	**Physics 1**				**(4 Credit)**
Prerequisite	-				
Content	Material properties – Physical quantities – Standard units and dimensions – frequency motion, mechanical properties for materials –fluid properties – viscosity – surface tension–sound waves – waves in elastic media - Heat and thermodynamics: heat transfer – Gas motion theory – First law of thermodynamics – entropy and second law of thermodynamics – temperature measurements and thermometers.				
Lecture	**2 hours /week**	**Laboratory**	**2 hours / week**	**Tutorial**	**2hours /week**

PHY 102	**Physics 2**				**(4 Credit)**
Prerequisite	-				
Content	Electricity and magnetism: charge and substance- electric field- column's law- electric flux- Gauss law- electric volt- condenser and insulation materials-current , resistance and electric force – ohm's law and simple circuits- magnetic field- Babot and Savart laws – magnetic flux and gauss law- Faraday law - Magnetic impedance Topics: engineering light – light properties for spherical surfaces – lenses and mirrors – wave properties for light and Hygen's principle - interference - polarization- and diffraction - Nuclear physics: nuclear construction – Bohar theorem – principle of quantum theory- laser – optical – electric phenomenon.				
Lecture	**2 hours / week**	**Laboratory**	**2 hours / week**	**Tutorial**	**2hours / week.**

LNG 101	Technical English Language 1				(2 Credit)
Prerequisite	-				
Content	Intensive guided practice in reading and analyzing expository and argumentative prose and in writing and revising essays that demonstrate coherent logical development, an ability to employ effective strategies of argument and persuasion, and a command of written English appropriate for college-level work				
Lecture	2 hours / week	Laboratory	-	Tutorial	1 hour / week

LNG 201	Technical English Language 2				(2 Credit)
Prerequisite	-				
Content	Introduction to academic research and writing through intensive investigation of an issue or topic specified by the instructor. Students will be required to develop and organize a substantial research project related to the topic of the course and to demonstrate the information literacy skills required to find, evaluate, and make appropriate use of primary and secondary materials relevant to their project.				
Lecture	2 hours / week	Laboratory	-	Tutorial	1 hour / week

ENG 101	Mechanics 1				(3 Credit)
Prerequisite	-				
Content	Applications of space vectors – results of group of Forces - momentums - equivalent couples – equivalent groups - equations of equilibrium for rigid bodies - Supports and pivots types - equilibrium under the effect of forces and the space couples - center of mass (groups of particles - flat surfaces) – moment of inertia (mean axes- equal surfaces).				
Lecture	2 hours / week	Laboratory	-	Tutorial	2hours / week.

ENG 102	Mechanics 2				(3 Credit)
Prerequisite	-				
Content	Position, displacement, velocity, and acceleration of particle – plane motion path of particle – description of plane motion using Cartesian axes – projectiles - tied motion for particle in straight path – motion in fixed axes -motion in polar axes – relative motion between particles - tied motion for particle in circular path – principle of work and energy of motion– principle of conservation of mechanical energy – principle of impulse and momentum of rigid body.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2hours /week.

ENG 103	Engineering drawing and projection	(3 Credit)
Prerequisite	-	
Content	Techniques and skills of engineering drawing – engineering operations – orthogonal projection – secondary orthogonal – solid bodies – intersections (cutters for solid bodies – intersections of surfaces) - personals – projections of simple bodies – rules of writing dimensions – drawing of perspectives – deduction of missing projections – drawing of engineering sections.	

	Drawing of the steel frames - binding and fixing devices - the assembled drawing for some mechanical steel components Introduction to AutoCAD Fundamentals of engineering drafting by way of computer aided drawing (CAD) software. Basic features and capabilities of CAD software and drafting fundamentals including orthographic projection, and isometric pictorials, part dimensioning in 2 dimensional drawings.				
Lecture	**1 hours / week**	**Laboratory**	**4 hours / week**	**Tutorial**	**-**

ENG 104	**Introductions to Computer Systems**				**(2 Credit)**
Prerequisite	-				
Content	Computer architecture – computer systems – files systems – computer networks – internet networks – Database systems and information technology – Computer graphics – multimedia systems – methods of solving problems – logical design for the programs and matrices – applications in programming using one structured or visual languages – using this language in solving the engineering problems.				
Lecture	**2 hours / week**	**Laboratory**	**1 hours / week**	**Tutorial**	**-**

ENG 105	**Production Engineering**			**(3 Credit)**
Prerequisite	-			
Content	The engineering substances and its properties - heating and cooling diagrams – heating equilibrium diagrams - alloys - casting operation (sand casting and the preparation of the mold) – forming processes (cold and hot forming: forging - rolling – wire drawing – blanking and piercing - deep drawing - the extrusion) – processes of metal connections (the riveting – welding with its types sticking) – cutting processes (cutting elements – processes – hand machining – automatic cutting machining: lathing - shaping – drilling –milling - grinding – work piece fixation - cutting tools fixation - specifications of the operating machine) – measuring tools (venire caliper – micrometers and its types) – engineering specifications – production cycle – production efficiency - industrial safety – practical training in the different workshops.			
Lecture	**2 hours / week**	**Laboratory**	**2 hours / week**	**Tutorial**	**-**

ENG 106	**Introductions to Engineering and Environment**				**(2 Credit)**
Prerequisite	-				
Content	**Engineering concepts**: What is engineering – international classification for the engineering jobs – relation between engineering development and environment economic and social development – engineering branches – ethics of the engineering jobs. **Introduction to environmental science**: the importance of studying environmental science – modern technology and its effect on the environment – quality of the environment and development elements – sources of environmental pollution and method of control (air pollution – water pollution – solid wastes pollution –noise) – economics of environmental pollution control – legislations for the environment protection.				

Lecture	2 hours / week	Laboratory	-	Tutorial	-

ENG 201	Computer Programming				(3 Credit)
Prerequisite	-				
Content	Basic concepts of programming, problem analysis and developing the programs charts, Primitive data types, operators, variables, Joptionpane & scanner Classes. Flow control I: If statement, If -Else, Nested IF, Switch. Flow control II: for statement, while, do-while, continue, return. Introduction to classes, objects and methods. Introduction to Graphical User Interface (GUI). Java Applets				
Lecture	2 hours /week	Laboratory	2 hours / week.	Tutorial	-

ENG 202	Engineering Thermodynamics				(4 Credit)
Prerequisite	ENG 102				
Content	Fundamental concepts - Properties of a pure substance – Equation of state - thermodynamic systems - Work and heat - First law of thermodynamics; Applications to Systems and Control Volumes - Second Law of Thermodynamics; Principle of Carnot cycles; Heat engines, Refrigerators and heat pumps - Principle of the increase of entropy - Applications to systems and control volumes - Irreversibility and availability - Power and refrigeration cycles.				
Lecture	3 hours / week	Laboratory	-	Tutorial	2 hours/ week.

ENG 208	Electrical Engineering Fundamentals				(3 Credit)
Prerequisite	-				
Content	Direct Current - Theory of electric circuits- Delta and Star connections - Sine A.C and D.C circuits - Time vectors diagram- Electric power and power factor in A.C circuits - 3-Phase current - Electric machines - D.C machines – Transformers - Induction and synchronous machines - Fractional power machines.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week

ENG 206	Introductions to Information Technology				(3 Credit)
Prerequisite	-				
Content	Introduction to the design and use of computer-based information systems - Software and hardware used in information systems - information requirements - Communication systems – Networking - The internet; the foundations, resources and uses of the internet, emphasizing practical skills for finding, reading and authorizing materials - Fundamentals of computer communication networks – Introduction to computer networking elements; communications architectures and protocols, HTML principles and applications - Case studies.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week

ENG 207	Technical Report Writing	(2 Credit)
Prerequisite	-	

Content	Writing the scientific reports by English language: The principles of report preparation - types of reports – formatting the reports – skills of figures and shapes – importing text – chart drawings – optical scanning for the pictures and documents – the border and notes operations in the reports. Saving and indexing the reports – searching for text – coping and safety of information – using the different computer programs packages for writing and demonstrating the reports.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**1 hours / week**

ENG 301	**Fluid Mechanics**				**(3 Credit)**
Prerequisite	**ENG 102**				
Content	Fluid properties, fluid statics, kinematics, fluid dynamics including energy and momentum equations, dimensional analysis, laminar flow, turbulent flow and its applications, forces on immersed bodies, introduction to compressible flow, applications to filtration and fluidization. Laboratory course in Fluid Mechanics includes experiments on venture-meter, friction losses in pipes, center of pressure, flow measuring apparatus, multi-pump test (Pump characteristics) and losses in piping systems.				
Lecture	**2 hours / week**	**Laboratory**	**1hours / week**	**Tutorial**	**1hours /week**

ENG 303	**Engineering Economy**				**(3 Credit)**
Prerequisite	-				
Content	This course covers the basic concepts of engineering economics as applied to the evaluation of capital investment alternatives in both the private and public sectors of our economy. Attention is given to the time value of money by showing the concepts and techniques for evaluating the worth of products, systems, structures, and services in relation to their cost. Economic and cost concepts: calculating economic equivalence, comparison of alternatives and replacement economy. Economic optimization in design and operations. Cost estimation of products and systems.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2hours / week**

ENG 205	**Strength of Materials**				**(3 Credit)**
Prerequisite	**ENG 101**				
Content	Simple states of stress and strain -Torsion stresses - Bending and shearing stresses in beams - Compound stresses - Analysis of plane stress - Combined stresses - Analysis of thin-walled pressure vessels - Deflection of beams.				
Lecture	**2 hours / week**	**Laboratory**	**1 hours /week.**	**Tutorial**	**1 hours /week.**

ENG 401	**Environmental Management**				**(2 Credit)**
Prerequisite	-				
Content	The importance of studying environmental science – modern technology and its effect on the environment – quality of the environment and development elements – sources of environmental pollution and method of control (air				

	pollution – water pollution – solid wastes pollution – noise) – economics of environmental pollution control – legislations for the environment protection.				
Lecture	**1 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week**

ENG 402	**Project Management and Control**				**(2 Credit)**
Prerequisite	-				
Content	Development, negotiation and specification of project contract. Project planning and control uses activity network models; network logic; scheduling; resource allocation; time-cost trade off methods; multi-project resource allocation and leveling using available industrial software.				
Lecture	**1 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

ENG 430	**Field Training 1**				**(0 Credit)**
Prerequisite	-				
Content	Practical work for at least 160 hours, on a specific practical engineering problem in one of the industrial, service, or consulting establishments under the supervisions of a staff member and a focal person from the selected establishment.				
Lecture	**-**	**Field**	**35 hours / week**	**Tutorial**	**-**

ENG 530	**Field Training 2**				**(0 Credit)**
Prerequisite	-				
Content	Practical work for at least 160 hours, on a specific practical engineering problem in one of the industrial, service, or consulting establishments under the supervisions of a staff member and a focal person from the selected establishment.				
Lecture	**-**	**Field**	**35 hours / week**	**Tutorial**	**-**

CIE 201	**Civil Engineering Drawing**				**(3 Credit)**
Prerequisite	**ENG 103**				
Content	Introduction to civil engineering projects: general concepts – legends and symbols – Scales and drawing size – general layout and plans – longitudinal and cross sections – Detailing – Drawings include structural steel sections and details, culverts, roof and floor plans, reinforcement details, housing details, transportation and irrigation structures, earth structures, computer graphics. AutoCAD Fundamentals of civil engineering drafting by way of computer aided drawing (CAD) software. Basic features and capabilities of CAD software and drafting fundamentals including orthographic projection, and, part dimensioning in 2 dimensional drawings.				
Lecture	**1 hours / week**	**Laboratory**	**-**	**Tutorial**	**4 hours / week.**

CIE202	**Structures Analysis 1**	**(3 Credit)**

Prerequisite	ENG 101				
Content	Basic concepts in structural analysis - Loads and reactions - Statically determinate beams - Statically determinate rigid frames - Statically determinate arches -Statically determinate trusses - Influence lines for statically determinate structures.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 203	Surveying 1				(3 Credit)
Prerequisite	-				
Content	Introduction to Surveying- Different types of Scales – Mapping using linear measurements – Compass surveying and traverse computations area determination – leveling: instrumentation, method of calculation, cross and longitudinal sections, contouring earth work Theodolite: temporary setting up, measuring of horizontal and vertical angles, permanent adjustment of theodolite, errors in measuring horizontal and vertical angles.				
Lecture	2 hours / week	Laboratory	1 hours / week	Tutorial	1 hours / week

CIE301	Structures Analysis 2				(4 Credit)
Prerequisite	CIE 202				
Content	Basic concepts in structure mechanics - Normal Stresses - Shear Stresses - Combined and Principal Stresses - Elastic deformations of statically determined structures - Statically indeterminate structures using the three moments equation.				
Lecture	3 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 302	Properties and Strength of Materials				(3 Credit)
Prerequisite	-				
Content	Manufacture and types of cements, properties and grading of aggregates, concrete workability tests and factors affecting the workability, factors affecting concrete strength in tension, compression and flexure, durability of concrete, mix design. Manufacture of bituminous binders, properties of bituminous binders and mixtures, design and uses of bituminous mixtures. Manufacture of steel, composition and structure of steel, heat treatment of steel, alloy steels.				
Lecture	2 hours / week	Laboratory	1 hours / week	Tutorial	1 hours / week.

CIE 303	Principles of Building Construction				(2 Credit)
Prerequisite	-				
Content	Building construction techniques; conventional methods, construction automation, Prefabricated methods. Architecture drawings and details, steps of the construction of a building, foundations, staircases, roofs, walls, paint, floorings, electrical and plumbing services, principles of architecture – theories – architecture panels details – basic architecture principles (utility – service – ventilation – properties).				
Lecture	1 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 304	Structures Analysis 3				(3 Credit)
Prerequisite	CIE 202				
Content	Statically Indeterminate Structures using force method - Slope Deflection Method - Moment Distribution Method - Introduction to Stiffness Method.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2hours / week

CIE 305	Hydrology and Irrigation Engineering				(3 Credit)
Prerequisite	ENG 301				
Content	Definitions-water resources-Irrigation water quality- soil -water plant relationships- estimating of water requirements - Introduction to various types of irrigation systems-surface irrigation systems-Sprinkler Irrigation-Drip irrigation- Planning and design of irrigation and drainage networks- managing and distribution of irrigation water-subsurface drainage - vertical drainage.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week

CIE 306	Reinforced Concrete 1				(4 Credit)
Prerequisite	ENG 205				
Content	Introduction to reinforced concrete - Design criteria - Design of sections subjected to moments - Bond length between concrete and steel bars - Shear in beams - Design of one way and two-way slabs- Load calculation in slabs and beams.				
Lecture	3 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 307	Surveying 2				(3 Credit)
Prerequisite	CIE 203				
Content	Indirect methods for distance measurement: stadia method, tangent methods, substance bar. Setting out of Horizontal and Vertical curves. Introduction to theory of errors and error analysis of surveying measurements. Coordinate systems and transformations coordinate computations: polar method, intersection, and resection. Modern methods for distance measurements: Distance measurement (EDM) and total stations. Setting out of engineering projects.				
Lecture	2 hours / week	Laboratory	1 hours / week.	Tutorial	1 hours / week.

CIE 308	Traffic and Transportation Engineering				(3 Credit)
Prerequisite	CIE 203				
Content	Measures of flow, speed and density. Statistical distribution of traffic characteristics. Travel-time, delay, speed, pedestrians, parking and accident studies. Capacity calculations for intersections and freeway sections. Traffic signals. Parking garages and terminals design. Roadway lighting. Traffic management. Freeway surveillance and control. IVHS. Public issues and administration General characteristics of transportation systems: streets and highways, rail, transit, air, water, and pipelines. Egypt transport system: an overview.				

	Fundamentals of traffic flow: time-space diagrams, capacity analysis, queuing theory. Transportation systems planning and demand analysis. Transport system design: Characteristics of driver, vehicle, and road. Route location, horizontal and vertical alignment, earthwork, drainage, and pavements. Economic evaluation. System operations, maintenance, and rehabilitation. Environmental impacts. Various laboratory experiments and design projects supplement the subject matter.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 401	**Open Channel Hydraulics**				**(3 Credit)**
Prerequisite	**ENG 301**				
Content	Principles of hydraulics of open channels including energy and momentum approaches. Concepts of critical flow, surface roughness and velocity distribution. Theory and application of uniform, gradually varied and rapidly varied flows. Elements of unsteady open channel flow. Hydraulic machines: Water turbines; Pelton Wheel, Francis and Kaplan turbines. Hydraulic pumps: Centrifugal, axial, well pumps- working of pumps in the pipe lines.				
Lecture	**2 hours / week**	**Laboratory**	**1 hours / week.**	**Tutorial**	**1 hours / week.**

CIE 402	**Steel Structures Design 1**				**(4 Credit)**
Prerequisite	**CIE 202**				
Content	Design of steel structures; Tension and compression members; Beams; Beam-columns; Built-up members; Plate girders; Connection; Design practice; Tutorial design workshops.				
Lecture	**3 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 403	**Reinforced Concrete 2**				**(4 Credit)**
Prerequisite	**CIE 306**				
Content	Design of hollow block slabs - Design of sections subjected to torsion - Design of flat slabs - Design of paneled beam slabs - Design of stairs.				
Lecture	**3 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 404	**Geology and Soil Mechanics 1**	**(3 Credit)**
Prerequisite	-	
Content	The earth and the universe; Scope of engineering geology; Geological processes and plate tectonics; Sources and Processes for both natural and aggregates needed for construction, minerals and rocks types. Structure geology, and influence of geological features on engineering works .Classification of soils, soil formation, soil constituents and their properties, physical properties of soils, basic engineering properties of soils, effective stress and pore pressure, permeability and seepage of soils, stresses and strains in a continuous body, consolidation; One dimensional consolidation, shear strength and failure of soils, stability analysis; Plastic equilibrium, upper and lower bound solutions, retaining	

	wall. Various laboratory experiments are performed to illustrate the basic principles of soil mechanics.				
Lecture	**2 hours / week**	**Laboratory**	**1 hours / week**	**Tutorial**	**1 hours / week**

CIE 405	**Computer Applications in Structural Engineering**				**(3 Credit)**
Prerequisite	**ENG 201**				
Content	Use the computer in the analysis of structural problems; concrete beams, columns and slabs; steel beams, columns and beam-columns – and in the analysis of water resources and environmental engineering problems. Computation of uniform and gradually varied flows in open channels. Pipe network design. Sewer system modeling. Design of water and wastewater treatment facilities For each area, the necessary theoretical background reviewed and discrete modeling methods as implemented in computer programs discussed and applied to selected problems. Extensive use of microcomputers.				
Lecture	**2 hours / week**	**Laboratory**	**2hours / week.**	**Tutorial**	**-**

CIE 406	**Water Supply and Sanitary Engineering**				**(3 Credit)**
Prerequisite	-				
Content	Sources of water supply - drinking water standards, quality requirement, groundwater collecting; Water transmission and distribution; Cold water systems; Waste and vent systems; Water treatment techniques - screening coagulation and flocculation, sedimentation, filtration, disinfection, softening removal, taste and odor removal.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 407	**Steel Structures Design 2**				**(4 Credit)**
Prerequisite	**CIE 402**				
Content	Steel frames design – riveted and bolted connections – high strength bolted connections – welded constructions – base connections – roof trusses – rigid frames design.				
Lecture	**3 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 408	**Reinforced Concrete 3**				**(4 Credit)**
Prerequisite	**CIE 403**				
Content	Design of halls with beam girders - Design of frames - Design of arches - Design of trusses and Vierendeel girder - Design of saw tooth roofs.				
Lecture	**3 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 411	**Construction Estimating and Trending**	**(3 Credit)**
Prerequisite	**Comp of 100 CH**	
Content	Principles of construction cost estimating; Quantity takeoff; Methods of detailed cost estimating; Analysis of labor and equipment costs; Construction tendering process; Bidding and contracting systems for construction projects; Laws and regulations related to the construction industry.	

Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 412	Air Conditioning Systems for Building				(3 Credit)
Prerequisite	Comp of 100 CH				
Content	Psychometric and process of air. Cooling load estimation. Refrigeration cycles. Water chiller systems. Air handling system. Cooling towers. Equipment selection. Installation, operation and maintenance of air conditioning systems.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 413	Design of Lighting Systems of Buildings				(3 Credit)
Prerequisite	Comp of 100 CH				
Content	Principles of lighting, lighting design for buildings which includes artificial lighting, point, line and area light sources, types and properties of luminaries, polar curves, design methods and calculations, glare index, lighting design standard, luminaries heat recovery system and lighting energy management, hybrid lighting, day lighting of buildings, effect of climate on lighting.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week

CIE 414	Productivity Enhancement Methods				(3 Credit)
Prerequisite	Comp of 100 CH				
Content	Identification of bottlenecks; impact of human performance on productivity. Effect of the interaction between technological advances and human capabilities on performance and productivity. Cost reduction and productivity improvement programs.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 415	Quality Assurance and Engineering Reliability				(3 Credit)
Prerequisite	Comp of 100 CH				
Content	Reliability of parallel and serial engineering systems. Life testing. Impact of reliability on the design process in engineering fields such as mechanical, electrical and structural engineering. Studies the effect of equipment reliability on product quality.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 416	Quality Control				(3 Credit)
Prerequisite	Comp of 100 CH				
Content	Reliability of parallel and serial engineering systems. Life testing. Impact of reliability on the design process in engineering fields such as mechanical, electrical and structural engineering. Studies the effect of equipment reliability on product quality.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 417	Reliability of Structures	(3 Credit)

Prerequisite	Comp of 100 CH				
Content	Fundamental concepts related to structural reliability, safety measures, load models, resistance models, and system reliability. Optimum safety levels, and optimization of design codes.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 418	Risk Management and Structures Safety				(3 Credit)
Prerequisite	Comp of 100 CH				
Content	Principles and practice regarding safety in building. Accidental prevention and safety control. Fire control. Fire resistance of building materials, safety provisions for fire and other hazards in building. Safety standards and codes. Governmental regulations and inspection procedures.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 501	Soil Mechanics and Foundation				(3 Credit)
Prerequisite	CIE 404				
Content	Index Properties of Soils - Classification of soil - Permeability of soil - Stresses in soil - Settlement and Contact Pressure - Consolidation of soil - Compaction of soil - Ground Improvement - Earth Pressure and Stability of Slopes - Foundations for structures.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 502	Highway and Airport Engineering				(3 Credit)
Prerequisite	CIE 308				
Content	Basic design control: motion of vehicles, sight distances, alignment, intersections. Earthwork: Soil classification, soil stabilization, flexible and right pavement, highway drain. Introduction to Airport Engineering. Aircraft characteristics. Air traffic control. Airport capacity. Airport configuration. Design of the landing area. Airport terminals. Design airport pavements. Lighting and markings.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 503	Legal, Professional, and Social Aspects of Engineering				(2 Credit)
Prerequisite	-				
Content	Building and construction contracts procedure, types of construction contracts, general conditions of contracts and contract documents, legal obligations and governing International and Egyptian Legislation, bond and insurance requirements, preparation of technical specifications, the role of the architect/engineer in the construction process. The development of the concepts of professionalism and ethics and the traditional practice of these concepts are considered in relation to changing situations in practice in the variety of employment conditions. Case histories will be discussed.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 504	Irrigation Works Design				(3 Credit)
Prerequisite	CIE 401				
Content	Canals and Drains: Classification, synoptic diagrams, design of cross and longitudinal sections. Culverts: hydraulic and structural design. Small bridges for irrigation work: hydraulic and structural design. Heading up structures: overflow and standing wave weirs, head and partial regulators, Barrages. Navigation structures: locks, gates, navigation connections. Crossing structures: syphons, Aqueducts, tunnels. Storage structures: Dams (Aswan dam, High dam)				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 505	Foundation Engineering 1				(3 Credit)
Prerequisite	CIE 404				
Content	Strip footing - Isolated and combined footing - Raft foundations - Pile foundations.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 506	Inland Navigation and Harbor Engineering				(3 Credit)
Prerequisite	-				
Content	Kinds of Harbors, Studies of the Natural Phenomena, Quays, Hydraulic Model Studies, Planning of Harbors, Light Houses and Guiding Signals, Breakwaters, Spillways, Dry Docks, Inland Navigation.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 509	Project 1 *				(3 Credit)
Prerequisite	Completing of 140 CH				
Content	The graduation project aims to explore students' ability and skills to comprehensively address and manage architectural and technical issues associated with a large-scale design project. The project examines and measures students' knowledge, skills, and collective outputs gained throughout their study in the faculty and department in a combined manner, that reflects identity and creativity in all its preliminary and analytical phases. A complete set of appropriately presented drawings, accompanied by a detailed report of the project's attributable studies and potential considerations should be implemented by each student.				
Lecture	2 hours / week	Laboratory	2 hours / week.	Tutorial	-

CIE 510	Project 2 *				(3 Credit)
Prerequisite	Completing of 140 CH				
Content	Continuation and conclusion of the investigations on the civil problems of Project 1; written reports and team presentations are required.				
Lecture	1 hours / week	Laboratory	4hours / week.	Tutorial	-

CIE 511	Bridge Engineering	(3 Credit)

Prerequisite	**Completing of 100 CH**				
Content	Different types of bridges – different methods in bridges construction –load calculations and its different effects – methods of bridges design using the standard specifications codes – using commercial computer packages for bridge design. Planning of bridge projects; Design, analysis and construction of various types of bridges including reinforced and pre stressed concrete bridges, steel bridges, composite bridges, and cable-supported bridges.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 512	**Coastal Engineering Fundamentals**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Effect of waves on coastal structures, design of seawalls and breakwaters, jetties, harbors, ship channels and pipelines, intentional and accidental discharge of pollutants, diffusion and spreading, oil spill containment and collection, wave theory and applications to engineering problems, analysis of wave data.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 513	**Technology of Concrete Constructions**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Advantages and limitations of concrete, types of cements and admixtures, batching equipment, types of mixers, ready-mixed concrete, pumping equipment, slip forming, shotcreting. Casting in lifts, finishing concrete, hot weather concreting, formwork design, methods of curing, and strength of concrete, destructive and nondestructive testing of concrete. Durability, repair and maintenance of concrete. Employment of major construction equipment and estimation of their production.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 514	**Construction Contraction**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Construction contracting for contractors, architects, owners. Organization and administration; industry structure, construction contracts, bonds, insurance. Planning, estimating, and control, quantity takeoff and pricing, labor and equipment estimates, estimating excavation and concrete, proposal preparation, scheduling, accounting and cost control. Students use contract documents to prepare detailed estimate.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 515	**Cost Analysis for Structure Projects**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Direct costs – indirect costs – collective systems - comparisons between projects – fundamentals of cost analysis for wood, steel and concrete buildings – preparing project and report writing – case study.				
Lecture	2 hours / week	**Laboratory**	**-**	**Tutorial**	2 hours / week.

CIE 516	Design of Earthquake Structures				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Earthquakes: causes, seismic waves, scales, equation of motion for single degree of freedom and multi-degree of freedom systems – Structures behavior under random forces – Spectral analysis depending on soil conditions – Modal analysis for multi-strong buildings – design principles for earthquake structures according to the Egyptian code.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 517	Design of Marine Platforms				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Marine platform (definition – types), loads affecting the marine platforms – tide and wind forces – design of fixed marine platforms.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 519	Design of Shell Structures				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Forces and stresses affecting the shell structures –analysis of shell structures– design of shell structures.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 520	Engineering Project Evaluation				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Fundamentals of project appraisal and feasibility study; Planning of civil engineering projects; Economic analysis of civil engineering projects; Introduction to environmental impact assessment and social impact assessment; Case studies on civil engineering project appraisal.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 521	Environmental Pollution Control				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Quality factors for environmental control. Population and resource use. Air pollution, water pollution, land pollution. Solid waste management. Thermal pollution, noise pollution. Radiation. Energy and the environment. Prediction and assessment of environmental impact. Problems of developing nations. Case studies				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 522	Fiber Reinforced Cement Composites	(3 Credit)
Prerequisite	Completing of 100 CH	
Content	Fiber-reinforcement of cement-based matrices, continuous and discontinuous fibers, and meshes. Fiber-reinforced concrete and Ferro-cement. Laminated	

	cementations composites. Behavior and mechanical properties. Mechanics of fiber reinforcement. Constitutive models. High-strength, high-performance fiber composites. Hybrid and smart composites. Lectures, projects and laboratory.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 523	**Groundwater Hydraulics**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Mechanics of flow through porous media, Darcy`s law, Potential flow theory, Steady and Unsteady flow to wells, Boundary effects and the method of images, Leaky aquifer theory, Partial penetration theory, Practical aspects of well design, Drilling and testing, Numerical methods, Analytical solutions, Case studies.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 524	**Highway Materials and Construction**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Application of soil classification methods, material characterization, sub-grade and sub-base stabilization, material variability and quality control, pavement evaluation and rehabilitation, highway construction.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 525	**Modern Structure Materials**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	General introduction for the technological development of material science – general classification of the modern materials in the structure field – compound materials and their applications – carbon fibers and its use in structures – insulating materials – artifice materials.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 526	**Hydraulics Engineering**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Elements of hydraulic structures design such as spillways, transitions, culverts, irrigation, drainage and flood control works.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 527	**Pavement Design**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Characteristics of pavement loads, stress analysis in pavements, design practices, construction, rehabilitation and maintenance, optimization of the design of rigid and Flexible pavements systems, empirical and mechanistic stochastic structural subsystems, utility theory, serviceability concept, cost studies, traffic delay, environmental deterioration, rehabilitation and maintenance optimization systems.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 529	Planning of Buildings Maintenance and Protection				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Review on of deterioration of building materials. Concept of life cycle cost- Protection methods against deterioration and corrosion of building materials. Types of defects and damages. Non-destructive tests. Partially destructive tests. Load tests. Materials for repair and selection. Methods and techniques of repair. Rehabilitation and retrofitting.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 530	Pre-fabricated Concrete Frames				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Prefabricated concrete performance – design of concrete supported to shear stress – design of Columbus – roofs and building frame – design project using the computer – detailed report.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 531	Project Decision Analysis				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Quantitative methods of decision-making. Important mathematical models useful in decision processes. Model-structure assumptions, limitations and methods for use. Concepts and models of support systems for management decision problems.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 532	Project Financial Management				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Cash flow and its analysis -project budget - project financial methods - risk and cost control - financial path for project - time value - profit rate - inflation effects.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 533	Project Management 2				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Evaluation and performance development for construction projects – productivity in construction works – The efficient utilization of project resources – construction economics – tender's strategies- different field applications.				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

CIE 534	Project Visibility Study	(3 Credit)
Prerequisite	Completing of 100 CH	
Content	The importance of visibility study for the projects - the definition of the visibility study and the historical development for it - the project essence and its principles	

	and forms – initial visibility studies and its elements - environmental visibility studies - important financial sides in visibility study - the important monetary sides in visibility study - the important marketing sides - the exhibition of the products and the effective parameters in it - the pricing policies - the situation of the government, the consumer and the competitive projects - the engineering and technical visibility for the project - study of the social visibility – evaluation methods of the visibility study.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 535	**River Engineering**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Classifications of rivers, data collection method; Velocity and flow rate measurement, design of hydraulic structures: dike, spillway, dam, gate, pumping station, sheet pile, Countermeasure on sediment control: corrosion, deposition, scour, bill of quantity and cost estimation, operation and maintenance.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 538	**Traffic Control System**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Introduction to existing and new traffic control systems strategies including both off-line signal optimization techniques and real-time computer traffic-responsive control concepts. Control concepts and methods for signal intersections, arterial systems and area traffic networks. Traffic control system evaluation techniques using Measures of Effectiveness (M.O.E.) for single intersections, arterial, and networks.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 539	**Reinforced Concrete 4**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Design of water structures - Design of concrete sections subjected to moments without cracking - Design of rectangular tanks - Design of circular tanks - Design of elevated tanks				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**
CIE 540	**Tunneling and Underground Excavation**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Introduction to tunnels –numerical methods in tunnel constructions– computer software packages and its applications in tunnels. Tunneling and excavations in hard rock - basic rock mechanics, shape, size and orientation of an opening, elastic deformation and the Kirsch solution, rock mass classification, support design and ground reaction curve, drill and blast method, NATM tunneling method. Tunneling in soft ground - problems of urban tunneling, deformation and surface settlement, load on liners, face stability, methods of soft ground tunneling including EPB and slurry shield methods.				

	Selection of methods of attack for excavation of tunnels and deep vertical sided openings. Tunneling procedures based on behavioral characteristics of soil and rock, study of tunnel boring machines, shielded and drill-and-blast operations, linings, soil linear interaction. Deep excavation procedures related to support of excavation systems, methods of installation and dewatering.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 541	**Urban Transportation Planning**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Land use-transportation interaction. The process of urban transportation planning, urban transport problems, goals, and objectives, data and information, survey design, travel demand forecasting: 1) trip generation, 2) trip distribution, 3) modal choice, 4) route assignment. The evaluation of urban transport systems, transport system management, demand management, and control.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 542	**Special Concrete Structures 1**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Introduction to tall building structures. Design criteria for tall building structures. Loading. Structural formation. Modeling for analysis. Braced frames. Rigid frames. Shear walls.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 543	**Foundation Engineering 2**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Hydraulics of Soils. Flow net in soil. Application of flow. Retaining walls. Sheet piles.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 544	**Special Concrete Structures 2**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Introduction to Composite construction – materials of composite constructions – simply supported composite beams – continuous beams – The shear connections – composite columns – composite slabs.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 545	**Railway Engineering**				**(3 Credit)**
Prerequisite	**Completing of 100 CH**				
Content	Engineering principles for railways planning – railways components and specifications – design of different parts of railways – types of stations – types of signals – maintenance – planning of the railway's lines – transportation economy –management and insurance.				
Lecture	**2 hours / week**	**Laboratory**	**-**	**Tutorial**	**2 hours / week.**

CIE 546	Reinforced Concrete 5				(3 Credit)
Prerequisite	Completing of 100 CH				
Content	Design of shell structures - Design of Pre-stressed reinforced concrete				
Lecture	2 hours / week	Laboratory	-	Tutorial	2 hours / week.

Appendix 1: Matrix of Courses Vs Competencies and aims for Civil engineering program.
Appendix 2: Matrix of Competencies Vs aims for Civil engineering program.
Appendix 3: Matrix of attributes Vs program aims for Civil engineering program.
Appendix 4: Matrix of mission and goals of the institute Vs competencies for Civil engineering program.
Appendix 5: Matrix of mission and goals of the institute Vs aims for Civil engineering program.
Appendix 6: Matrix of Competencies Vs Teaching and Learning Methods.
Appendix 7: Matrix of Methods and rules for student evaluation Vs Teaching and Learning Methods.

Program Coordinator: Prof. Mohamed Elkiki
Head of Department: Prof. Mohamed Elkiki
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