CONSTRUCTION ENGINEERING & TECHNOLOGY

PROGRAM SPECTIFICATION

2022-2023

PRGRAM COORDINATOR: ASSOC.PROF. DR. TAMER ELGOHARY

1. Basic Information:

A. **Program Title:** Construction engineering & technology
B. **Program type:** Single
C. **Departments responsible of the program:**
   a. Department of Civil Engineering
D. **Date of approval of Program specification by the Institute Council:** Approved on 9/9/2004 .
E. **Coordinator:** Assoc.Prof. Dr. Tamer Elgohary, Head of civil Engineering department.
F. **Year of operation:** 2022/2023
G. **Date of program regulation approval:**9/9/2004

1.1 External Evaluators:

The most recent program external evaluation has been conducted by: (**Appendix 1)** shows the external evaluators' reports:

External Evaluators	Date of review	Action
Prof. Dr.		All comments were covered

1.2-Professional Information:

1.2.1 Program Mission and Aims

1.2.1.1 Program mission

The mission of Civil Engineering Department is to provide education that is driven by a professional and technology-oriented focus and highly committed to sustainability. The department is devoted to educating and inspiring future generations of designers who are both technically skilled and ethically professional.

.

1.2.1.2 Program Aims

The program construction engineering & technology aims at enriching the Egyptian civil engineering sector and Society with capable and skilled who are dedicated to the construction and design of civil structures. In addition to introducing pioneers in community. The following are the aimed graduate attributes:

1. Apply knowledge and understanding of the interdisciplinary fundamentals of construction, environmental engineering, structure, Civil Engineering and their integration,
2. Demonstrate the scientific principles relevant to the elements and components of Civil & water different systems.
3. Use analytical and practical skills appropriate for designing Civil & water different system.
4. Act professional topics related to current economic, social and ethical issues that promote life-long learning and ability for continuous self-improvement.
5. Improve team skills that enable them to work and communicate effectively while solving technical problems in a multidisciplinary environment.
6. Develop , innovate and adopt new directions in their advance education.

1.2.1.3 The attributes of construction engineering & technology program engineers

The graduates should be able to:

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

2. *Competencies of the Graduate of Civil Engineering Program & Intended learning outcomes (LOS)*

The *Civil Engineering Graduate* must be able to:

A- Engineering

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

LO1. Identify complex engineering problems by applying engineering fundamentals, basic science, and mathematics.

LO2. Apply engineering fundamentals, basic science, and mathematics to formulate complex engineering problems.

LO3. Select appropriate methods for solving 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.

LO4. Develop and conduct appropriate experimentation, analyze, and interpret data, and use statistical analyses engineering judgment to draw conclusions

LO5. Analyze and interpret data using appropriate simulation tools.

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.

LO6. Apply engineering design processes to produce cost-effective solutions that meet specified needs

LO7. Illustrate contextual constraints such as global, social, cultural, economic, environmental and sustainability imperatives as an integral part of the design process.

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

LO8. 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.

LO9. Identifies current developments and technologies related to civil engineering.

LO10. Applies selected research literature in the field of civil engineering.

A6 Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.

LO11. Apply fundamental systems engineering processes and/or project management tools to the planning, design, simulation, and execution of project work.

LO12. Adapt contextual issues, including financial management into all phases of engineering project work.

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

LO13. Functions as an effective member or leader of diverse engineering teams, including those with multi-level, multi-disciplinary and multi-cultural dimensions.

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

LO14. Communicate effectively, graphically, verbally and in writing, employing 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.

LO15. Use creative, innovative, and flexible thinking anticipate and respond to new situations.

LO16. Practice 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

LO17. Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.

B- Civil

B1 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.

LO18. Demonstrate engineering principals in hydrology, environmental, plant water soil relationships and basics of Civil Engineering.

LO19. Demonstrate engineering principals in soil mechanics, structural analysis, Hydraulics and Fluid Mechanics

LO20. Explain properties, behavior and fabrication of building materials and Select appropriate building materials from the perspective of strength, durability, suitability of use to location, temperature, weather conditions and impacts of seawater and environment

LO21. Select and design adequate water control structures, structure system, irrigation water networks, sewerage systems and ground flow.

LO22. Observe, record and analyze data in laboratory and in the field

LO23. Demonstrate engineering principals in surveying and prepare quantity surveying reports

B2 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.

LO24. Describe engineering principles in the fields of reinforced concrete and metallic structures' analysis and design and foundations, Sanitary Works, waste water, Irrigation, Water Resources.
LO25. Analyze and select codes of practices in designing reinforced engineering Concrete and metallic structures of all types. Determine the levels, types and design systems of building foundations.

B3 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.

LO26. Define, plan, conduct and report management techniques
LO27. Assess and evaluate different techniques and strategies for solving engineering problems.
LO28. Practice professionally construction management skills. Prepare technical drafts and detailed drawings both manually and by using CAD or Geographic information system
LO29. Plan the construction of all types of reinforced concrete, steel, irrigation and drainage systems.
LO30. Apply safe systems at work and observe the appropriate steps to manage risks.

B4 Deal with biddings, contracts and financial issues including project insurance and guarantees.
LO31. Outline projects and construction management including planning, finance, and contracts

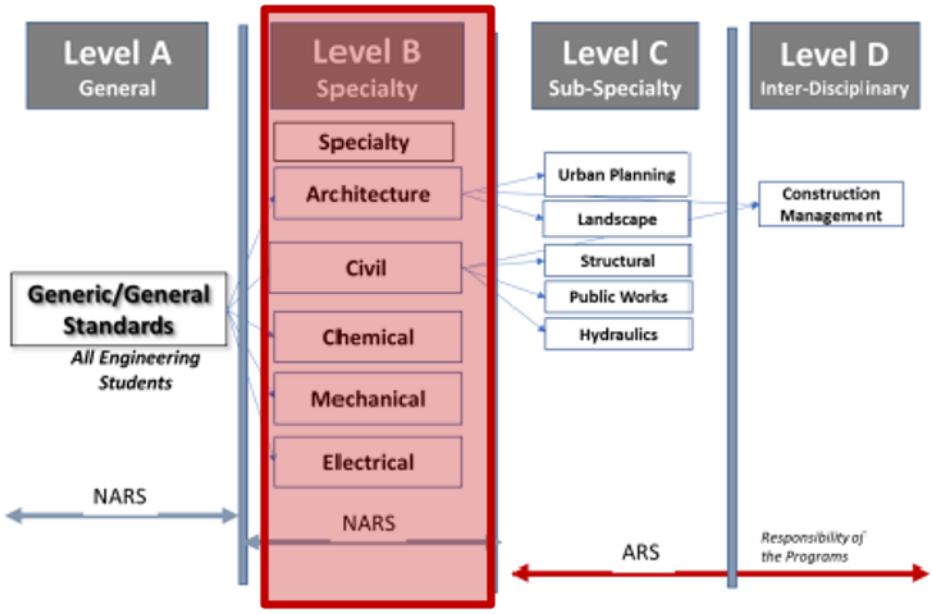
2. LO32. Apply quality assurance procedures and follow codes and standards.

3- External Reference Standards and bench marks :

Not present.

4-Academic Standards:

Academic References Standards of the civil engineering program was referenced by the National Academic References Standards (NARS 2018). NARS 2018 was set by National Authority for Quality Assurance and Accreditation of Education in Egypt (http://cmp.eng.cu.edu.eg/wp-content/uploads/sites/8/cmp1/2014/EngineeringNARS18.pdf). It was enhanced and adopted as academic standards to be suitable for the program (Institute council No. 1) on 8/2003, Program ILOs vs. NARS, Program ILOs vs. Program aims and Program ILOs vs. Program courses association matrices were constructed (Appendices 1and 2).



5-Program Structure and components:

a. Program duration: **Five academic years**.

b. Curriculum structure:

- Credit hours: 300 contact hours
- Theoretical and practical hours distribution

Theoretical hours:		Tutorial / Lab/ Workshop hours:		Total	300

- Mandatory and elective credit hours distribution

Mandatory hours:	284	Elective hours:	16	Total	300
Institute	60	Department	240	Total	300

c. Program structure:

		Contact hours	%	NARS %
1	Humanities and Social Sciences			9-12
2	Basics Sciences			20-26
3	Basic Engineering Sciences (Institute/Spec. Req.)			20-23
4	Applied Engineering and Design			20-22
5	Computer Applications and ICT*			9-11
6	Projects* and Practice			8-10
7	Discretionary (Institution character-identifying) subjects			6-8

d. Program Levels:

Study level	Student level	Percentage of the earned credit hours	
		Elective	Mandatory
1	Freshman	0 %	20 %
2	Sophomore	0 %	20 %
3	Junior	0 %	20 %
4	Senior 1	0 %	20 %
5	Senior 2	5.34 %	14.66 %

e. Program courses

e.1 Institute Requirements (General Engineering)

First year – General Engineering

الفرقة الأولى – هندسة عامة

Course Code	Course Name	First Semester						Second Semester						Total Marks	اسم المقرر
		Hrs/Week		Maximum Marks			Exam Period	Hrs/Week		Maximum Marks			Exam period		
		Lect	Ex/ Lab	Final Exam	Year work	Oral		Lect	Ex/ Lab	Final Exam	Year Work	Oral			
BAS 111	Mathematics (1)	4	2	100	50		3							150	رياضيات (1)
BAS 121	Physics (1)	3	2	90	30	30	3							150	الفيزيقا (1)
BAS 151	Drawing & Projection Engineering		4	70	30		3							100	الرسم والإسقاط الهندسي
ELE 131	An Introduction to computers & Information	2	3	60	20	20	3							100	مقدمة الحاسبات ومعالجة المعلومات
MEC 141	Production Engineering & Manufacturing	4	2	90	30	30	3							150	هندسة الإنتاج والتصنيع
HUM 171	English Language (1)	2	2	30	20		3							50	لغة إنجليزية (1)
BAS 112	Mathematics (2)							4	2	100	50		3	150	رياضيات (2)
BAS 122	Physics (2)							3	2	90	30	30	3	150	الفيزيقا (2)
BAS 131	Mechanics							3	2	100	50		3	150	ميكانيكا
BAS 141	Chemistry							2	2	60	20	20	3	100	كيمياء
BAS 152	Engineering Drawing								4	70	30		3	100	الرسم الهندسي
ELE 141	Computer Programming (1)							2	2		60	40	3	100	برمجة الحاسب
HUM 151	Technology & society							2		30	20		2	50	التكنولوجيا والمجتمع
	Total Hrs /week	15	15					16	14					Total Marks	1500
		30						30							

e.2 Program Requirements

Second year – Construction Engineering

الفرقة الثانية – هندسة وتكنولوجيا التشييد

Course Code	Course Name	First Semester						Second Semester						Total Marks	اسم المقرر
		Hrs/Week		Maximum Marks			Exam Period	Hrs/Week		Maximum Marks			Exam period		
		Lect	Ex/ Lab	Final Exam	Year work	Oral		Lect	Ex/ Lab	Final Exam	Year Work	Oral			
BAS 211	Mathematics (3)	4	2	100	50		3							150	رياضيات (3)
BAS 231	Mechanics (2)	3	2	70	30		3							100	ميكانيكا (2)
CIV 221	Strength of Material & Testing	4	2	100	25	25	3							150	خواص واختبارات المواد
CIV 241	Surveying (1)	4	2	100	25	25	3							150	مساحة (1)
CIV 281	Civil Engineering Drawing		4	70	30		3							100	الرسم المدني
HUM 241	Economics	2	1	70	30		3							100	الاقتصاد الهندسي
BAS 212	Mathematics (4)							4	2	100	50		3	150	رياضيات (4)
MEC 231	Thermo Dynamics							4	2	100	50		3	150	الهندسة الحرارية
CIV 211	Structural Analysis (1)							4	2	100	50		3	150	تحليل إنشائي (1)
CIV 231	Geological Engineering							3	2	70	30		3	10	جيولوجيا هندسية
CIV 262	Computer Aided Drafting (CAD)								4		60	40	3	100	استعمال الحاسب الآلي AutoCAD
HUM 222	Scientific Thinking							2	1	70	30		3	100	التفكير العلمي
	Total Hrs /week	17	13					17	13					Total Marks	1500
		30						30							

Third year – Construction Engineering

الفرقة الثالثة – هندسة وتكنولوجيا التشييد

Course Code	Course Name	First Semester						Second Semester						Total Marks	اسم المقرر
		Hrs/Week		Maximum Marks			Exam Period	Hrs/Week		Maximum Marks			Exam period		
		Lect	Ex / Lab	Final Exam	Year work	Oral		Lect	Ex/ Lab	Final Exam	Year Work	Oral			
BAS 312	Probability & Statics	3	2	70	30		3							100	نظرية الإحتمالات والإحصاء
ELE 382	Electrical Power & Machines	2	2	60	20	20	3							100	القوى الكهربية والماكينات
CIV 321	Construction Materials	4	2	100	25	25	3							150	مواد الإنشاء
CIV 341	Legislation & contracts	2	1	70	30		3							100	تشريعات وعقود
CIV 381	Fluid Mechanics (1)	4	2	100	25	25	3							150	ميكانيكا موائع (1)
CIV 361	Surveying (2)	4	2	100	25	25	3							150	مساحة (2)
BAS 313	Numerical Computing Analysis							2	2	70	30		3	100	تحليل عددي
CIV 311	Structural Analysis (2)							4	2	100	50		3	150	تحليل إنشاءات (2)
CIV 331	Geotechnical Engineering							4	2	100	25	25	3	150	هندسة جيوتكنية
CIV 382	Irrigation & Drainage							4	2	100	50		3	150	ري وصرف
CIV 383	Hydraulics							3	2	60	20	20	3	100	هيدروليكا
Arc 343	Building Construction							2	1	70	30		3	100	إنشاء معماري

Total Hrs/week	19	11
	30	

Total Hrs/week	19	11
	30	

Total Marks 1500

Fourth year – Construction Engineering

الفرقة الرابعة – هندسة وتكنولوجيا التشييد

Course Code	Course Name	First Semester						Second Semester						Total Marks	اسم المقرر
		Hrs/Week		Maximum Marks			Exam Period	Hrs/Week		Maximum Marks			Exam period		
		Lect	Ex / Lab	Final Exam	Year work	Oral		Lect	Ex/ Lab	Final Exam	Year Work	Oral			
CIV 411	Structural Analysis(3)	4	2	100	50		3							150	تحليل إنشائي (3)
CIV 412	Reinforced Concrete Design (1)	4	2	100	50		3							150	تصميم منشآت خرسانية (1)
CIV 443	Electrical & Mechanical Installation in Buildings	2	2	70	30		3							100	التركيبات الكهربية والميكانيكية في المباني
CIV 451	Highway & Traffic Engineering	4	2	100	50		3							150	هندسة الطرق والمرور
ARC 414	Architectural Design & Town Planning	4	2	100	50		3							150	تصميم معماري وتخطيط مدن
HUM 411	Technical Report Writing	2		30	20		2							50	كتابة تقارير فنية
CIV 413	Reinforced Concrete Design (2)							4	2	100	50		3	150	تصميم منشآت خرسانية (2)
CIV 414	Structural Steel Design (1)							4	2	100	50		3	150	تصميم منشآت معدنية (1)
CIV 431	Foundation Engineering (1)							4	2	100	50	25	3	150	هندسة الأساسات (1)
CIV 441	Methods & Equipment of construction							2	2	70	30		3	100	طرق التشييد ومعدات البناء
CIV 442	Project Management							2	1	70	30	20	3	100	إدارة المشروعات
CIV 471	Environmental Engineering							3	2	70	30		3	100	هندسة بيئية

Total Hrs/week	20	10
	30	

Total Hrs/week	19	11
	30	

Total Marks 1500

Fifth year – Construction Engineering

الفرقة الخامسة – هندسة وتكنولوجيا التشييد

Course Code	Course Name	First Semester						Second Semester						Total Marks	اسم المقرر
		Hrs/Week		Maximum Marks			Exam Period	Hrs/Week		Maximum Marks			Exam period		
		Lect	Ex / Lab	Final Exam	Year work	Oral		Lect	Ex/ Lab	Final Exam	Year Work	Oral			
CIV 591	Project	1	3					2	6		300			300	المشروع
CIV511	Reinforced Concrete Design (3)	4	2	100	50		3							150	تصميم منشآت خرسانية (3)
CIV 512	Design of Steel Structures (2)	4	2	100	50		3							150	تصميم منشآت معدنية (2)
CIV 531	Foundation Engineering (2)	4	2	100	50		3							150	هندسة الاساسات (2)
CIV 5x1	Elective Course (1)	2	2	70	30		3							100	مقرر اختياري (1)
CIV 5x2	Elective Course (2)	2	2	70	30		3							100	مقرر اختياري (2)
CIV 541	Financial Management in Construction							2	2	70	30		3	100	الادارة المالية في أعمال التشييد
CIV542	Maintenance & Repair in Structures							3	1	70	30		3	100	أعمال الصيانة والترميم للمنشآت
CIV 572	Sanitary Engineering							4	2	100	50		3	150	الهندسة الصحية
CIV 5x3	Elective Course (3)							2	2	70	30		3	100	مقرر اختياري (3)
CIV 5x4	Elective Course (4)							2	2	70	30		3	100	مقرر اختياري (4)

Total Hrs/week: 17 + 13 = 30

Total Hrs/week: 15 + 15 = 30

Total Marks: 1500

e.3. Elective courses

1st Semester Elective Course المقررات الاختيارية للفصل الدراسي الاول

CIV 513	Computer Analysis of Structures	تحليل منشآت بالحاسب الآلي
CIV 514	Wall Bearing Structure	المنشآت ذات الحوائط الحاملة
CIV 515	Reinforced Concrete Shell Roofs	أسقف الخرسانة المسلحة القشرية
CIV 521	Quality Control & Assurance	ضبط الجودة والتأكد
CIV 522	Inspection & Non Distractive Testing	الفحص والاختبارات غير المتلفة
CIV 532	Ground Improvement	تحسين التربة
CIV 543	In site testing & Construction Technologies of foundation	تكنولوجيا الصب والتشييد في الاساسات

2nd Semester Elective Course المقررات الاختيارية للفصل الدراسي

CIV 516	Reliability & fire safety of R.C Structures	الامان ضد الحريق في المنشآت الخرسانية
CIV 517	High Rise Building & R.C Towers	المباني العالية والابراج الخرسانية
CIV 533	Tunnels & Unground Structures	الانفاق والمنشآت تحت الارض
CIV 551	Construction Technology of Highway and Airports	تكنولوجيا انشاء الطرق والمطارات
CIV 561	Photogrammetry & Remote Sensing	الاستشعار عن بعد وتطبيقاته
CIV 562	Geographic Information System GIS	نظم المعلومات الجغرافية

Contact Hours

Total contact hours 300

f. Courses Contents:

As mentioned in courses specifications and bylaw.

6. Program Admission Requirements

a. Secondary Egyptian Schools Graduates.
b. Secondary School Certificate Graduates of other countries are eligible to join this program if they met the minimum grades set by Admission Office of the Ministry of Higher Education.
c. The study begins with a preparatory year for all students before specialization in Civil Engineering. Students' departmental allocation is in accordance with the institute Council regulations.

7. Graduation requirements (Completion of program):

a- The student is considered successful if he passes the examinations in all courses of his class.

b- The student is promoted to the next higher level if he fails in not more than two subjects of his class or from lower classes,

c- In addition to the two subjects mentioned in the previous item, the student who fails in two subjects in humanities and social sciences, whether from his class or from lower classes, is admitted to the transfer to the consecutive higher level. Passing successfully in all courses before obtaining the B.Sc. degree is a prerequisite.

d- The referred student has to sit the examination in the courses in which he has failed together with the students studying the same courses. The student gets a pass grade when he passes the examination successfully. In case the student was considered absent with acceptable excuse in a course, he gets the actual grade

f- The grades of the successful student in a course and in the general grade are evaluated as follows:

1. Distinction: from 85% of the total mark and upwards
2. . Very good: from 75% to less than 85% of the total mark.
3. Good from: 65% to less than 75% of the total mark
4. Pass: from: 50% to less than 65% of the total mark

g-The grades of a failing student in a course are estimated in one of" the following grades: Weak: from 30% to less than 50% of the total mark Very weak: less than 30% of the total mark.

h- The B.Sc. general grade for students is based on the cumulative marks obtained during all the years of study. The students are then arranged serially according to their cumulative sum

i - The student is awarded an honor degree in his cumulative sum is distinction or very good provided that he gets a grade not less than very good in any class of study other than the preparatory year. Moreover, he should have not failed in any examination he has sat in any class other than the preparatory year.

8- Graduation Minimum contact Hours Required

The minimum number of credit hours required for graduation as specified in the bylaw is 300 contact hours.

9- Academic degree Requirements

The curriculum of all academic programs in the institute includes the following group of courses:

(a) institute requirements (Mandatory general engineering): Is a group of 60 contact hours courses to develop the personality of students. They must be completed by all students as part of the graduation requirements for the chosen field of specialization.

(b) Program requirements (Mandatory Civil engineering): are 224 contact hours group courses to develop the specialty of students according to Civil Engineering discipline

(b) Program requirements (Elective Civil engineering): are 16 contact hours group courses to develop the specialty of students according to Civil Engineering discipline .

10-Student Assessment (Methods and rules for student assessment)

Intended Learning Outcomes	Assessment methods								
	Written exam	Online exam	Oral Exam	Mid Term Exam	Attendance	Project	Report and sheet	Laboratory exam	Quiz
A-Knowledge and Understanding	√	√	√	√		√	√	√	√
B- Intellectual Skills	√	√	√	√		√	√	√	√
C-Practical and Professional Skills	√	√	√	√		√	√	√	√
D-General and Transferable Skills			√		√	√	√		

11. Program Evaluation Methods:

	Evaluator	Method	Sample
1	Senior Students	Questionnaire and brain storming	40 %
2	Alumni	Questionnaire	20 -30
3	Stakeholders	Questionnaire, meetings and discussions	Representative sample
4	External evaluator	Provide reports after site visit and document examination	1
5	Internal evaluators for courses	Provide reports after document examination	1

Program Coordinator and **Institute Dean**

Assoc.Prof. Dr. Tamer Elgohary **Prof. Dr. Esam Khalifa**

Signature: **Signature:**

Date: 1/ 9/2022

Prepared concerning NAQAAE form No. 13