



Construction Engineering and Management Program

B.Sc. Program Specification

Bylaw 2017 according to NARS2018

Benha University – Benha Faculty of Engineering

2022-2023

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A- General

1. Basic Information

Program Title	Construction Engineering and Management
Program Type	<input checked="" type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Multiple
Department responsible of program	Civil Engineering Architecture Engineering
Program Coordinator	Dr. Ahmed Youssef Kamal El-Deen
Quality Coordinator	Dr. Rasha Mohey Al-Deen
Date of program Approval	2/10/2017 No 5241
Date of Internal Evaluator	March 2023
Internal Evaluator	Hanan al-Tobji
Date of External Evaluator	June 2023
External Evaluator	Mohamed Abdel Basset Abdo
Program URL	https://beng.bu.edu.eg/depts/new-programs/construction-engineering-and-management-program

B- Professional Information

1. Program Mission

The Benha faculty of Engineering Construction Engineering and Management program aims to develop the skills and knowledge students need to successfully complete construction projects on time and on budget while adhering to construction standards and safety guidelines within human values and social responsibility. Graduates will have sufficient knowledge and skills to develop their postgraduate research skills and find a local or international employment in the commercial, design-build, and residential sectors of the construction industry.

2. Program Objectives (PO)

The objectives of the BSc in The Construction Engineering and Management program are to enable its graduates to:

PO1. Apply a wide spectrum of engineering knowledge, science, and specialized skills with analytic, critical, and systemic thinking to identify and solve engineering problems in real-life situations.

PO2. Behave professionally, adhere to engineering ethics and standards, and work to develop the profession and community and promote sustainability principles.

PO3. Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.

PO4. Master self-learning and life-long learning strategies to communicate effectively in academic/professional fields.

PO5. Apply analytical, experimental, design, construction engineering techniques and project management skills with proficiency aided by modern tools.

PO6. Graduate a postgraduate student who has the necessary scientific knowledge and innovative thinking needed for the Construction engineering and management engineering field.

3. Graduates Attributes (GA)

By the completion of the Construction Engineering and Management program of study, and according to NARS 2018, the graduate will be capable 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 to 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.

In addition to all engineering graduate attributes defined by NARS 2018, Construction and Management engineering graduates should be able to:

- 11.** Identify the essential construction processes technologies techniques, Properties, behavior & fabrication of construction materials.
- 12.** Master Projects management, including planning, finance, bidding, contract procedures, cost estimators, and quality systems.
- 13.** Use the different analytical and computational methods that can be applied to the various areas of construction and building engineering.

4. Student Competencies (SC)

The program courses fulfill the **NARS 2018**

In addition to the competencies for all Engineering Programs (**A-Level**), the Construction Engineering and Management Program graduate must be able to (**B-Level**)and (**D-Level**):

Level A: The engineering graduate must be able to:

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

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

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

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

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

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

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

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

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

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

Level B: The engineering graduate must be able to:

B1: Select appropriate and sustainable technologies for the 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.

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.

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.

B4: Deal with biddings, contracts and financial issues including project insurance and guarantees.

Level D: The engineering graduate must be able to:

D1: Create architectural, urban, and planning designs that satisfy both aesthetic and technical requirements, using adequate knowledge of history and theory, related fine arts, local culture and heritage, technologies, and human sciences

D2: Generate ecologically responsible, environmental conservation and rehabilitation designs; through an understanding of structural design, construction, technology, and engineering problems

5. Program Academic Standards

-Academic reference Standards of Construction Engineering and Management program approved by faculty council in **12/11/2019 No. 385**

6. Reference standards

- National Academic Reference Standards of (NARS) 2018 which were issued by the National Authority for Quality Assurance & Accreditation of Education NAQAAE.

7. Program Structure and Contents

7.1 Program Duration: five years (10 semesters)

7.2 Program Structure:

Total hours of the program:-	178 hours
Theoretical:-	121 hours
Practical/Exercises:-	152 hours
Compulsory:-	105 hours
Elective Course:-	8 hours
Humanity – Elective :-	8 hours
Selective:-	none

7.3 Program Courses VS Requirements

7.3.1 List of Compulsory Courses

Level	Courses		Pr. Req.	Weekly Contact Hours					Credit Hours of Requirements			
	Code	Course Title		Cr. Hrs	Lect.	Lab.	Tut.	Total	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirements
1st Level	FRB 101	Mathematics I	....	3	2	0	2	4		3		
	FRB 103	Mechanics I	....	3	2	0	2	4		3		
	FRB 105	General Chemistry	....	3	2	2	1	5		3		
	FRB 107	Physics I	....	3	2	2	2	6		3		
	FRM 109	Engineering Graphics	....	4	2	0	5	7		4		
	UHS 101	English language	....	2	2	0	0	2	2			
	FRB 102	Mathematics II	FRB101	3	2	2	2	6		3		
	FRB 104	Mechanics II	FRB103	3	2	0	2	4		3		
	FRM 106	Production Engineering	.....	3	2	3	0	5		3		
	FRB 108	Physics II	FRB107	3	2	2	2	6		3		
	FRE 110	Computer Programming	....	3	2	3	0	5		3		
UHS 102	Social Issues	.....	2	2	0	0	2	2				
2nd Level	FRB 201	Mathematics III	FRB102	3	2	0	2	4		3		
	CMC 201	Structural Analysis-1	FRB104	3	2	0	3	5			3	
	CMC 203	Properties Engineering Materials	FRB107	3	2	1	2	5			3	
	CMC 205	Construction Engineering Drawings	FRM109	2	1	0	2	3				2
	CMC 207	Surveying for Engineers-1	FRB101	3	2	1	2	5			3	
	CMC 209	Concrete Technology	.....	2	1	0	2	3				2
	UHS 201	Technical writing	.....	2	2	0	0	2	2			
	FRB 202	Mathematics IV	FRB201	3	2	0	2	4		3		
	CMC 202	Structural Analysis-2	CMC201	3	2	1	2	5			3	
	CMC 204	Construction Materials	CMC203	3	2	0	2	4				3
	CMC 206	CAD for Civil Engineering	CMC205	3	2	2	0	4			3	
	CMA 208	Basic Architectural Engineering	FRM109	2	1	0	2	3				2
	CMM 210	Fundamental of Thermal Engineering	FRB107	3	2	0	2	4				3
UHS 202	Engineering Economics	.....	2	2	0	0	2	2				

Level	Courses		Pr. Req.	Weekly Contact Hours					Credit Hours of Requirements			
	Code	Course Title		Cr.Hrs	Lect.	Lab.	Tut.	Total	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirements
3rd Level	FRB 301	Numerical Methods	FRB201	3	2	0	2	4		3		
	CMC301	Hydraulics for Civil Engineer	FRB107	3	2	1	3	6			3	
	CMC 303	Structural Analysis-3	CMC202	3	2	0	3	5			3	
	CMC305	Soil Mechanics	CMC204	3	2	0	3	5			3	
	CMC307	Building Construction & City Planning	CMC204	3	2	0	2	4				3
	CMC309	Project Management	.....	2	2	0	0	2				2
	FRB 302	Probabilities & Statistics	FRB201	3	2	0	2	4		3		
	CMC302	Water Resources, Irrigation & Drainage	CMC301	3	2	1	3	6			3	
	CMC 304	Design of R.C. structures-1	CMC202	3	2	0	3	5			3	
	CMC306	Surveying for engineers-2	CMC207	3	2	0	3	5			3	
	CMM 308	Technical Installations in Buildings	CMM210	3	2	0	2	4				3
HS3XX	Humanities–Elective1	.....	2	2	0	0	2	2				
4th Level	CMC 401	Design of Metallic Structures-1	CMC202	3	2	0	3	5			3	
	CMC 403	Environmental & Sanitary Engineering	CMC301	3	2	0	2	4			3	
	CMC 405	Construction Management	CMC309	2	1	0	2	3				2
	CMC 407	Foundation Engineering	CMC305	3	2	0	3	5			3	
	CMC 409	Design of R.C. Structures2	CMC304	3	2	0	3	5			3	
	CMC 411	Cost Engineering & Quantity Surveying	.....	2	1	0	2	3				2
	UHS 401	Legislation & Engineering Ethics	.....	2	2	0	0	2	2			
	CMC 402	Design of Metallic Structures-2	CMC401	3	2	0	3	5			3	
	CMC 404	Design of Hydraulic Structures	CMC301	3	2	0	3	5			3	
	CMC 406	Environmental Engineering	CMC403	3	2	0	3	5			3	
	CMC 408	Construction Methods	.....	2	1	0	2	3				2
	CMC 410	Slope Stability & Retaining Structure	CMC305	2	1	0	2	3				2
	CMC 412	Highway Engineering	CMC305	3	2	0	2	4			3	
HS4XX	Humanities – Elective 2	.....	2	2	0	0	2	2				

Level	Courses		Pr. Req.	Weekly Contact Hours					Credit Hours of Requirements			
	Code	Course Title		Cr.Hrs	Lect.	Lab.	Tut.	Total	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirements
5th Level	CMC 501	Concrete and Steel Bridges	CMC409	3	2	0	3	5			3	
	CMC 503	Dynamics of Structures	CMC202	3	2	0	3	5			3	
	CMC 5XX	Elective Course-1		3	2	0	3	5				3
	CMC 5XX	Elective Course-2		3	2	0	3	5				3
	CMC 509	Project-1	*	3	2	0	3	5				3
	HS 5XX	Humanities – Elective 3	.....	2	2	0	0	2	2			
	CMC 502	Computer Applications in Civil Engineering	FRE110	3	2	3	0	5				3
	CMC 504	Quality Control & Inspection of Structures	CMC202	3	2	0	2	4			3	
	CMM 506	Equipment for Construction	.....	2	2	0	1	3				2
	CMC 5XX	Elective Course-3		3	2	0	3	5				3
	CMC 5XX	Elective Course-4		3	2	0	3	5				3
	CMC 512	Project-2	CMC 509	3	0	0	6	6				3
	HS 5XX	Humanities – Elective 4	.....	2	2	0	0	2	2			
FT	CMC/E380	Field Training I	**									
	CMC/E480	Field Training II	***									
Total hours of five Levels									18	43	66	51
% Hours of five Levels									10.11236	24.1573	37.07865	28.65169
Reference Ratio									min 8%	min 20%	min35%	max30%

* The student can register for the Senior Design Project course after passing 70% of the program cr. hrs,

** Completion of 80 Credit Hours

***Completion of 120 Credit Hours

7.3.2 List of Elective Courses

Level	Courses		Pr. Req.	Weekly Contact Hours					Credit Hours of Requirements				
	Code	Course Title		Cr.Hrs	Lect.	Lab.	Tut.	Total	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirements	
Elective Course-1	Fifth	CMC505	Building Construction	....	3	2	0	3	5				3
		CMC507	Advanced Engineering Materials	CMC202 , CMC204	3	2	0	3	5				3
		CMC509	Special Topics in Structural Analysis	CMC202	3	2	0	3	5				3
Elective Course-2	Fifth	CMC511	Techniques of Planning, Scheduling and Project Control	CMC309	3	2	0	3	5				3
		CMC513	Construction Management-2	CMC405	3	2	0	3	5				3
		CMC515	Urban Planning	CMC307	3	2	0	3	5				3
Elective Course-3	Fifth	CMC508	Transportation & Logistics	.....	3	2	0	3	5				3
		CMC510	Prefabricated Water and Pre-stressed Concrete Structures	CMC409	3	2	0	3	5				3
		CMC512	Analysis and Design of Composite Structures	CMC402	3	2	0	3	5				3
Elective Course-4	Fifth	CMC514	Special Topics in Geotechnical Engineering	CMC407	3	2	0	3	5				3
		CMC516	Total Quality Management	CMC504	3	2	0	3	5				3
		CMC518	Value Engineering in the Construction Industry	.....	3	2	0	3	5				3

8. Subject Area

Subject Area	Required	Program Total Credit Hours	
		Total hours of five Levels	% Hours of five Levels
Humanities and Social Sciences	9-12%	18	10.11
Mathematics and Basic Sciences	20-26%	36	20.22
Basic Engineering Sciences	20-23%	40	22.47
Applied Engineering and Design	20-22%	39	21.91
Computer Applications and ICT	9-11%	18	10.11
Projects and Practice	8-10%	15	8.42
Discretionary	6-8%	12	6.74

9. Program Admission Requirements

- For obtaining a bachelor's degree in Construction Engineering and Management, registration is allowed for those who have a general secondary certificate or who are transferred from other faculties.
- Students who are not enrolled directly to the faculty of engineering, Benha University, through the National Coordination Office, but has achieved the minimum Engineering Sector requirement, can join the programs paying the separate Tuition Fees decided by the Faculty Council every year
- The required bachelor's degree duration **must not be less than 9 semesters**.
- The maximum study limit **is ten academic years**, provided that the student is enrolled at the minimum credit limit for one semester.
- The academic year consists of three semesters:
 - The first semester (the **Fall Semester**) and its duration is fifteen weeks and starts on the third Saturday of September.
 - The second semester (**Spring Semester**) and its duration is fifteen weeks and starts on the second Saturday of February.
 - The **Summer Semester** and its duration is not less than seven weeks and starts from the first Saturday of July.

10. Regulations for Progression and Program Completion

- For obtaining a bachelor's degree from the Faculty of Engineering in Benha in the new program, Credit Hours system, the student should be successfully passed in **178 credit hours**, and with average points of **at least 2.00**
- Success in the graduation Project
 - **Zero-Credit courses are marked as Pass or Fail (as the Summer Training).** The student gets a grade but does not contribute to the cumulative GPA. To pass the course, the student should get at least 60% of the course total marks.
- The grades for each course are distributed in percentages between the semester work of research, reports and tests, Practical/oral exams, mid-semester exam, final written exam.
- A written exam is held for each course in the middle of the semester and a written exam at the end of the semester.
- The grades for each course are distributed according to the following table:

Work	Week	% Degree
First Exam (mid-term)	7	30
Second Exam (Written Exam)	12	20
Semester Work	During the Semester	10
Final Exam	16	40

- grades for a project Graduation, are evaluated based on 50% semester work and 50% end-of-year discussion
- The student fails the course if he obtains an F grade (less than 60% of the course marks) or was not allowed to attend the final examination because of exceeding the absence percentage or cheating ... etc. or did not attend the final examination without submitting a prior excuse that is approved by the council of the administration of the program.
- For the student to pass a course, the minimum mark that must be earned in the final exam is 30% of the total exam marks, otherwise the student will fail the course irrespective of the total marks he earned in the course, and he will get an F grade in this course.
- The student must attend at least 75% of all course contact hours to be allowed to attend the course final examination.
- **If the grades of one of the courses include a practical or oral test, they are included in the grades of the written exam (Second Exam).**
- A student that absents from the final written exam is considered failed the course.
- If one of the courses does not include a written exam (such as the graduation project), the practical or oral exams are treated as the written exam.

11. Course Grades , Honors and Awards

- The student will be assessed in the exams each academic year, and the total grade will be according to one of the following:
 - **A⁺** : More than 97% (Points =4.00), **A** : (93- 97)% (Points =4.00), **A⁻** :(89- 93)% (Points = 3.70)
 - **B⁺** : (84-89)% (Points =3.30), **B** : (80-84)% (Points =3.00), **B⁻** :(76-80)% (Points=2.70)
 - **C⁺** : (73-76)% (Points =2.30), **C** : (70-73)% (Points =2.00), **C⁻** :(67-70)% (Points=1.70)
 - **D⁺** : (64-67)% (Points =1.30), **D** : (60-64)% (Points =1.00)
 - **F** : Less than 60% (Points=0.00)
- For a student to achieve the declaration of honor, he has to fulfill the following conditions:
 - Maintain a cumulative GPA of 3.3 throughout his study at the Program and any semester GPA should be higher than or equal 3.3.
 - Does not fail any course throughout his study at the Program.
 - Did not get any penalty throughout his study at the Faculty
- When a student repeats a course in which he previously obtained a grade (F) or was absent without an excuse (NE), the grade he obtained in the repetition is calculated with a maximum of (B+). but when he studies a course in which he previously obtained a grade of absence with an excuse (E), the grade is calculated for him which he obtained in the replay.
- In all cases, when calculating the cumulative average, it is calculated the last grade only, provided that both grades are mentioned in the student's academic record.
- The points obtained by the student in each course are calculated as the number of credit hours for the course multiplied by the points obtained by the student according to the table of grades.
- Calculates the GPA Semester average score for any semester, by dividing the sum of Points earned by the student in this semester, divided by the total credit hours for these courses.
- The cumulative GPA is calculated at the end of each semester by dividing the sum of all course points that the student has studied by the sum of credit hours for these courses.
- The total cumulative point average is calculated by dividing the sum of all course's points by the total number of credit hours studied by the student for these courses.

12. Program Evaluation

Evaluator	Tool	Sample
Senior Students	Questionnaire-meeting	50% of the students
Graduates	Questionnaire-meeting	25 % of the Graduates
Stakeholders	Questionnaire-meeting	10
Internal Evaluator	Report	3/2023
External Evaluators	Report	6/2023

13. Program Matrices

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13.1 Faculty Mission vs. Program Mission Matrix

Faculty Mission		Program Mission		
		The Benha faculty of Engineering Construction Engineering and Management program aims to develop the skills and knowledge students need to successfully complete construction projects on time and on budget while adhering to construction standards and safety guidelines within human values and social responsibility. Graduates will have sufficient knowledge and skills to develop their postgraduate research skills and find a local or international employment in the commercial, design-build, and residential sectors of the construction industry.		
		The Benha faculty of Engineering Construction Engineering and Management program aims to develop the skills and knowledge students need to successfully complete construction projects on time and on budget	Adhering to construction standards and safety guidelines within human values and social responsibility.	Graduates will have sufficient knowledge and skills to develop their postgraduate research skills and find a local or international employment in the commercial, design-build, and residential sectors of the construction industry.
Benha Faculty of Engineering - Benha University is committed to graduate well prepared engineers equipped with knowledge and skills necessary to compete in labor market, and capable of using and developing modern technology, and providing research in engineering fields to serve society and community.	Benha Faculty of Engineering - Benha University is committed to graduate well prepared engineers equipped with knowledge and skills necessary to compete in labor market	*		
	Capable of using and developing modern technology		*	
	Providing research in engineering fields to serve society and community			*

13.2 Program Mission vs. Program Objectives Matrix

Program Mission		Program Objectives					
		PO1	PO2	PO3	PO4	PO5	PO6
The Benha faculty of Engineering Construction Engineering and Management program aims to develop the skills and knowledge students need to successfully complete construction projects on time and on budget while adhering to construction standards and safety guidelines within human values and social responsibility. Graduates will have sufficient knowledge and skills to develop their postgraduate research skills and find a local or international employment in the commercial, design-build, and residential sectors of the construction industry.	The Benha faculty of Engineering Construction Engineering and Management program aims to develop the skills and knowledge students need to successfully complete construction projects on time and on budget	*				*	
	Adhering to construction standards and safety guidelines within human values and social responsibility.		*	*	*		
	Graduates will have sufficient knowledge and skills to develop their postgraduate research skills and find a local or international employment in the commercial, design-build, and residential sectors of the construction industry.				*	*	*

13.3 Student Competences Vs. (NARS 2018) CBE Matrix

Student Competences	(NARS 2018) CBE Matrix															
	A - Level										Civil				Arc.	
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B1	B3
A 1	*															
A 2		*														
A 3			*													
A 4				*												
A 5					*											
A 6						*										
A 7							*									
A 8								*								
A 9									*							
A 10										*						
B 1											*					
B 2												*				
B 3													*			
B 4														*		
D 1															*	
D 2																*

13.4 Program Learning Outcomes Vs. (NARS 2018) CBE Matrix

Program Learning Outcomes	(NARS 2018) CBE Matrix															
	A - Level										Civil				Arc.	
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B1	B3
PLO 1	*															
PLO 2		*														
PLO 3			*													
PLO 4				*												
PLO 5					*											
PLO 6						*										
PLO 7							*									
PLO 8								*								
PLO 9									*							
PLO 10										*						
PLO 11											*					
PLO 12												*				
PLO 13													*			
PLO 14														*		
PLO 15															*	
PLO 16																*

13.5 Program Learning Outcomes Vs. Student Competences

Program Learning Outcomes	Student Competences															
	A - Level										B-Level				D-Level	
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2
PLO 1	*															
PLO 2		*														
PLO 3			*													
PLO 4				*												
PLO 5					*											
PLO 6						*										
PLO 7							*									
PLO 8								*								
PLO 9									*							
PLO 10										*						
PLO 11											*					
PLO 12												*				
PLO 13													*			
PLO 14														*		
PLO 15															*	
PLO 16																*

13.6 Program Mission vs. (NARS 2018) CBE Matrix

Program Mission		(NARS 2018) CBE															
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2
The Benha faculty of Engineering Construction Engineering and Management program aims to develop the skills and knowledge students need to successfully complete construction projects on time and on budget while adhering to construction standards and safety guidelines within human values and social responsibility. Graduates will have sufficient knowledge and skills to develop their postgraduate research skills and find a local or international employment in the commercial, design-build, and residential sectors of the construction industry.	The Benha faculty of Engineering Construction Engineering and Management program aims to develop the skills and knowledge students need to successfully complete construction projects on time and on budget	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*
	Adhering to construction standards and safety guidelines within human values and social responsibility.			*		*	*	*	*	*	*			*		*	*
	Graduates will have sufficient knowledge and skills to develop their postgraduate research skills and find a local or international employment in the commercial, design-build, and residential sectors of the construction industry.				*	*	*	*	*		*		*	*	*		

13.7 Program Objectives vs. (NARS 2018) CBE Matrix

Program Objectives	Program Competencies															
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2
PO1	*	*		*					*		*	*		*	*	
PO2		*	*				*			*		*	*	*	*	*
PO3							*	*	*				*	*		
PO4					*	*		*		*					*	*
PO5	*	*		*		*	*	*			*	*	*	*	*	*
PO6	Will be covered through postgraduate courses															

13.8 Program Objectives vs. Graduate Attributes Matrix

Program Objectives	Graduate Attributes												
	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12	GA13
PO1	*	*					*				*		*
PO2			*		*	*		*				*	
PO3				*						*		*	
PO4						*			*			*	
PO5							*				*		*
PO6								*			*	*	*

13.9 Graduate Competencies Vs Graduate Attributes

Graduate Competencies	Graduate Attributes												
	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12	GA13
A1	*	*									*		*
A2		*											*
A3			*		*	*					*		*
A4						*	*				*		*
A5								*			*		*
A6				*								*	
A7				*								*	
A8									*			*	
A9										*		*	
A10								*			*	*	
B1											*		
B2											*		
B3												*	
B4												*	
D1												*	*
D2												*	*

13.10 Student Competencies Vs Courses

Compulsory Courses			Student Competencies																	
Level	Code	Course Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D1	Total	
First Level	Fall Sem.	FRB 101	Mathematics I	1	1														2	
		FRB 103	Mechanics I	1	1															2
		FRB 105	General Chemistry	1	1															2
		FRB 107	Physics I	1	1															2
		FRM 109	Engineering Graphics						1		1									2
	UHS101	English language					1			1		1							3	
	Spring Sem.	FRB 102	Mathematics II	1	1															2
		FRB 104	Mechanics II	1	1															2
		FRM106	Production Engineering				1		1											2
		FRB 108	Physics II	1	1															2
FRE 110		Computer Programming	1	1															2	
UHS102	Social Issues					1		1			1							3		
Second Level	Fall Sem.	FRB 201	Mathematics III	1	1														2	
		CMC201	Structural Analysis-1	1									1						2	
		CMC 203	Properties of Engineering Materials		1								1							2
		CMC 205	Construction Engineering Drawings								1			1						2
		CMC 207	Surveying for Engineers-1		1					1				1						3
		CMC 209	Concrete Technology			1								1						2
		UHS 201	Technical writing								1	1								2
Second Level	Spring Sem.	FRB 202	Mathematics IV	1	1														2	
		CMC 202	Structural Analysis-2		1								1						2	
		CMC 204	Construction Materials	1									1						2	
		CMC 206	CAD for Civil Engineering				1							1					2	
		CMA 208	Basic Architectural Engineering								1	1						1	3	

Compulsory Courses			Student Competences														Total				
Level	Code	Course Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4		D1	D1		
S. Level	S. Sem.	CMM210	Fundamental of Thermal Engineering	1										1					2		
		UHS 202	Engineering Economics	1								1								2	
Third Level	Fall Sem.	FRB 301	Numerical Methods	1	1														2		
		CMC301	Hydraulics for Civil Engineer		1	1								1						3	
		CMC 303	Structural Analysis-3	1										1						2	
		CMC305	Soil Mechanics					1						1						2	
		CMC307	Building Construction & City Planning					1			1							1		3	
		CMC309	Project Management							1							1		1	3	
	Spring Sem.	FRB 302	Probabilities & Statistics	1	1															2	
		CMC302	Water Resources, Irrigation & Drainage		1										1					2	
		CMC 304	Design of R.C. structures-1			1	1								1				1	4	
		CMC306	Surveying for engineers-2					1						1						2	
		CMM308	Technical Installations in Buildings					1					1	1				1		4	
		HS3XX.....Humanity – Elective 1																			
		HS302	Human Resource Management				1	1													2
		HS304	Strategic Management				1	1													2
HS306	Computer and Society				1	1													2		
HS308	Accounting				1	1													2		
Fourth Level	Fall Sem.	CMC 401	Design of Metallic Structures-1			1	1							1					3		
		CMC 403	Environmental & Sanitary Engineering		1											1			1	3	
		CMC 405	Construction Management							1		1					1			3	
		CMC 407	Foundation Engineering			1									1					2	
		CMC 409	Design of R.C. Structures2			1	1								1				1	4	
		CMC 411	Cost Engineering & Quantity Surveying	1							1							1			3
		UHS 401	Legislation & Engineering Ethics									1	1							2	

Compulsory Courses			Student Competences														Total				
Level	Code	Course Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4		D1	D1		
Fourth Level	Spring Sem.	CMC 402	Design of Metallic Structures-2			1	1							1					3		
		CMC 404	Design of Hydraulic Structures			1	1								1				1	4	
		CMC 406	Environmental Engineering					1								1			1	3	
		CMC 408	Construction Methods				1			1									1	3	
		CMC 410	Slope Stability & Retaining Structure											1	1					2	
		CMC 412	Highway Engineering					1							1	1				3	
	HS4XX.....Humanity – Elective 2																				
		HS402	Foundations of Marketing					1	1			1								3	
		HS404	Introduction to Finance					1	1			1								3	
		HS406	Human Computer Interaction					1			1	1								3	
		HS408	Sustainable Development					1			1	1								3	
	Fifth Level	Fall Sem.	CMC 501	Concrete and Steel Bridges			1	1							1	1				3	
CMC 503			Dynamics of Structures	1		1								1					3		
CMC5XX.....Elective Course-1																					
			CMC 505	Building Construction					1				1						1	1	4
			CMC 507	Advanced Engineering Materials						1			1							1	3
			CMC 509	Special Topics in Structural Analysis						1			1							1	3
CMC5XX.....Elective Course-2																					
			CMC 511	Techniques of Planning, Scheduling and Project Control						1			1					1		1	4
			CMC 513	Construction Management-2						1			1					1		1	4
			CMC 515	Urban Planning						1			1						1	1	4
			CMC 509	Project-1			1	1		1	1	1	1	1	1	1	1	1		1	12
HS5XX.....Humanity – Elective 3																					
	HS501	Specifications and feasibility studies								1	1								2		
	HS503	Analytical Skills and Critical Thinking								1	1								2		
	HS505	Communication Laws and Codes								1	1								2		
	HS507	Construction Contracts and Law								1	1								2		

Compulsory Courses			Student Competences														Total					
Level	Code	Course Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4		D1	D2			
Fifth Level	Spring Sem.	CMC 502	Computer Applications in Civil Engineering			1									1	1				3		
		CMC 504	Quality Control & Inspection of Structures				1							1							2	
		CMM506	Equipment for Construction					1								1					2	
		CMC5XX.....Elective Course-3																				
		CMC 508	Transportation & Logistics	1		1										1						3
		CMC 510	Prefabricated Water and Pre-stressed Concrete Structures	1		1										1						3
		CMC 512	Analysis and Design of Composite Structures	1		1										1						3
		CMC5XX.....Elective Course-4																				
		CMC 514	Special Topics in Geotechnical Engineering					1				1					1	1				4
		CMC 516	Total Quality Management					1				1					1	1				4
		CMC 518	Value Engineering in the Construction Industry					1				1					1	1				4
		CMC 512	Project-2			1	1		1	1	1	1	1	1	1	1	1	1		1		12
		HS5XX.....Humanity – Elective 4																				
		HS502	Professional Communication Skills				1					1										2
		HS504	Principles of industrial health					1				1										2
		HS506	Social Risks and Security of Computer Systems				1					1										2
		HS508	Risk Management				1					1										2
		FT	CMC/E380	Field Training I							1			1			1					3
			CMC/E480	Field Training II							1			1			1					3
Total Number of courses covering each A			22	18	16	19	22	11	10	17	22	11	16	19	12	10	5	15				

13.11 Program Courses Vs Subject Area

Level	Courses		Weekly Contact Hours			Credit Hours of Subject Area						
	Code	Course Title	Lect.	Lab.	Tut.	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
1 st Level	FRB 101	Mathematics I	2	0	2		*					
	FRB 103	Mechanics I	2	0	2		*					
	FRB 105	General Chemistry	2	2	1		*					
	FRB 107	Physics I	2	2	2		*					
	FRM 109	Engineering Graphics	2	0	5			*				
	UHS 101	English language	2	0	0	*						
	FRB 102	Mathematics II	2	2	2		*					
	FRB 104	Mechanics II	2	0	2		*					
	FRM 106	Production Engineering	2	3	0			*				
	FRB 108	Physics II	2	2	2		*					
	FRE 110	Computer Programming	2	3	0		*					
	UHS 102	Social Issues	2	0	0	*						
2 nd Level	FRB 201	Mathematics III	2	0	2		*					
	CMC 201	Structural Analysis-1	2	0	3			*				
	CMC 203	Properties Engineering Materials	2	1	2			*				
	CMC 205	Construction Engineering Drawings	1	0	2			*				
	CMC 207	Surveying for Engineers-1	2	1	2			*				
	CMC 209	Concrete Technology	1	0	2			*				
	UHS 201	Technical writing	2	0	0	*						
	FRB 202	Mathematics IV	2	0	2		*					
	CMC 202	Structural Analysis-2	2	1	2					*		

Level	Courses		Weekly Contact Hours			Credit Hours of Subject Area						
	Code	Course Title	Lect.	Lab.	Tut.	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
2 nd Level	CMC 204	Construction Materials	2	0	2			*				
	CMC 206	CAD for Civil Engineering	2	2	0					*		
	CMA 208	Basic Architectural Engineering	1	0	2			*				
	CMM 210	Fundamental of Thermal Engineering	2	0	2			*				
	UHS 202	Engineering Economics	2	0	0	*						
3 rd Level	FRB 301	Numerical Methods	2	0	2		*					
	CMC301	Hydraulics for Civil Engineer	2	1	3			*				
	CMC 303	Structural Analysis-3	2	0	3			*				
	CMC305	Soil Mechanics	2	0	3				*			
	CMC307	Building Construction & City Planning	2	0	2			*				
	CMC309	Project Management	2	0	0					*		
	FRB 302	Probabilities & Statistics	2	0	2		*					
	CMC302	Water Resources, Irrigation & Drainage	2	1	3			*				
	CMC 304	Design of R.C. structures-1	2	0	3				*			
	CMC306	Surveying for engineers-2	2	0	3					*		
	CMM 308	Technical Installations in Buildings	2	0	2				*			
	HS3XX	Humanities–Elective1	2	0	0	*						
4 th Level	CMC 401	Design of Metallic Structures-1	2	0	3				*			
	CMC 403	Environmental & Sanitary Engineering	2	0	2				*			
	CMC 405	Construction Management	1	0	2					*		
	CMC 407	Foundation Engineering	2	0	3				*			
	CMC 409	Design of R.C. Structures2	2	0	3				*			
	CMC 411	Cost Engineering & Quantity Surveying	1	0	2					*		
	UHS 401	Legislation & Engineering Ethics	2	0	0	*						

Level	Courses		Weekly Contact Hours			Credit Hours of Subject Area						
	Code	Course Title	Lect.	Lab.	Tut.	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
4 th Level	CMC 402	Design of Metallic Structures-2	2	0	3				*			
	CMC 404	Design of Hydraulic Structures	2	0	3				*			
	CMC 406	Environmental Engineering	2	0	3				*			
	CMC 408	Construction Methods	1	0	2						*	
	CMC 410	Slope Stability & Retaining Structure	1	0	2						*	
	CMC 412	Highway Engineering	2	0	2				*			
	HS4XX	Humanities – Elective 2	2	0	0	*						
5 th Level	CMC 501	Concrete and Steel Bridges	2	0	3				*			
	CMC 503	Dynamics of Structures	2	0	3				*			
	CMC5XX	Elective Course-1	2	0	3							*
	CMC5XX	Elective Course-2	2	0	3							*
	CMC 509	Project-1	2	0	3						*	
	HS 5XX	Humanities – Elective 3	2	0	0	*						
	CMC 502	Computer Applications in Civil Engineering	2	3	0					*		
	CMC 504	Quality Control & Inspection of Structures	2	0	2						*	
	CMM506	Equipment for Construction	2	0	1						*	
	CMC5XX	Elective Course-3	2	0	3							*
	CMC5XX	Elective Course-4	2	0	3							*
	CMC 512	Project-2	0	0	6						*	
HS 5XX	Humanities – Elective 4	2	0	0	*							
FT	CMC/E380	Field Training I										
	CMC/E480	Field Training II										
Total hours of five Levels						18	36	40	39	18	15	12
% Hours of five Levels						10.11	20.22	22.47	21.91	10.11	8.42	6.74
Reference Ratio from NARS						9-12%	20-26%	20-23%	20-22%	9-11%	8-10%	6-8%

13.12 Student Competencies Vs Learning and Teaching Methods

Teaching & Learning Methods	Program Learning Outcomes															
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2
Lecture	*		*	*		*		*			*	*	*	*	*	*
Tutorials	*		*	*		*		*			*	*	*	*	*	*
Computer-based Instruction		*		*							*	*	*	*		*
Problem-based Learning	*			*					*		*	*	*	*		*
Project-based Learning			*			*	*		*				*		*	*
Interactive Learning		*					*	*	*	*	*					*
Presentations		*	*	*	*				*		*	*	*	*	*	*
Case Study			*	*					*	*			*		*	*
Report					*		*		*	*	*	*				
Co-operative Learning					*		*				*					*
Brain Storming				*			*	*	*				*			
Projects			*			*	*	*	*							*
Discussion	*	*	*					*		*	*	*	*	*	*	*
Practical-based Learning		*		*		*	*	*			*	*	*	*		
Self-Learning					*					*	*					
Hybrid Learning	*		*	*	*				*	*	*	*	*	*	*	*
Teaching and Learning Methods for Students with Special Needs:																
Methods																
1. Discussion Session																
2. Extra Lectures																
3. Create classroom centers																
4. Rotate lessons																
5. Provide different levels of books and materials																

13.13 Student Competencies Vs Assessment Methods

Teaching & Learning Methods		Program Learning Outcomes															
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2
Formative Assessment Method																	
Tests	Oral Test		*			*	*	*	*	*	*	*					
	Written Exam	*		*	*		*		*			*	*	*	*	*	*
	Experimental		*					*					*	*	*		
	Quizzes	*	*	*	*		*		*			*	*	*	*	*	*
Reports		*	*			*		*		*	*	*	*				
Observation		*	*			*		*		*			*	*			
Discussions		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Projects	Projects		*	*	*	*	*	*	*	*	*		*	*	*	*	*
	Mini Projects		*	*		*	*	*	*	*	*		*	*	*	*	*
Assignments		*	*	*	*		*		*			*	*	*	*	*	*
Presentations					*	*	*	*		*	*	*	*	*	*	*	*
Summative Assessment Method																	
Practical			*					*				*	*	*			
Oral Exam			*			*	*	*	*	*	*	*					
Final Exam		*		*	*		*		*		*	*	*	*	*	*	*

13.14 Assessment Methods Vs. Teaching and Learning Methods

Assessment Methods		Teaching and Learning Methods															
		Lecture	Tutorials	Computer-based Instruction	Problem-based Learning	Project-based Learning	Interactive Learning	Presentations	Case Study	Report	Co-operative Learning	Brain Storming	Projects	Discussion	Practical-based Learning	Self-Learning	Hybrid Learning
Formative Assessment Method																	
Tests	Oral Test					*		*	*	*			*	*	*	*	*
	Written Exam	*	*										*				*
	Experimental			*										*			
	Quizzes	*	*										*				*
Reports								*		*			*			*	*
Observation					*		*				*	*					
Discussions		*	*		*	*		*	*	*			*				*
Projects	Projects				*		*	*	*	*	*	*	*	*	*	*	*
	Mini Projects				*	*	*	*	*	*	*	*	*	*	*	*	*
Assignments			*	*	*												*
Presentations		*				*		*	*	*		*				*	*
Summative Assessment Method																	
Practical				*										*			
Oral Exam						*		*	*	*		*	*	*	*	*	*
Final Exam		*	*										*				*