



**Benha University**



**Benha Faculty of Engineering**



**Civil Engineering Department**



# **Civil Engineering Program**

**B.Sc. Program Specification**

**Bylaw 2012 according to NARS2018**

**Prepared by**

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### A- Basic Information

<b>Program Title</b>	<b>Civil Engineering Program</b>
<b>Program Type</b>	<input checked="" type="checkbox"/> <b>Single</b> <input type="checkbox"/> <b>Double</b> <input type="checkbox"/> <b>Multiple</b>
<b>Department responsible of program</b>	<b>Civil Engineering Department</b>
<b>Program Coordinator</b>	<b>Prof. Dr. Ahmed Eldebaiky</b>
<b>Quality Coordinator</b>	<b>Dr Ahmed Gamal M. Morsi</b>
<b>Date of program Approval</b>	<b>2013</b>
<b>Date of Interior Evaluator</b>	<b>Juley 2023</b>
<b>Name of Interior Evaluator</b>	<b>Prof Dr Hanan Eltobgy</b>
<b>Date of Exterior Evaluator</b>	
<b>Name of Exterior Evaluator</b>	
<b>Program URL</b>	<b><a href="https://www.beng.bu.edu.eg/index.php/departments/civil">https://www.beng.bu.edu.eg/index.php/departments/civil</a></b>

## **B- Professional Information**

### **1. Program Mission**

The mission of the civil engineering program is to develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership. The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools. The program focuses on professional practices in civil engineering preparing its graduates for the labor market, societal needs, while equipping them with lifelong learning skills.

### **2. Program Objectives**

1. **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 situation.
2. **PO2.** Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles.
3. **PO3.** Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.
4. **PO4.** Use techniques, skills, and modern engineering tools necessary for engineering practice.
5. **PO5.** Master self-learning and life-long learning strategies to communicate effectively in academic/professional fields.
6. **PO6.** Design of constructions that meet specified needs with appropriate attention to health and safety risks, applicable standards, economic, environmental, cultural, and societal considerations.
7. **PO7.** Incorporate economics and business practices including project risk and change management into the practice of engineering and to understand their limitations.

### **3. Graduates Attributes**

According to NARS 2018 the graduate attributes of civil engineering are:

1. **GA1.** 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. **GA2.** Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.
3. **GA3.** Behave professionally and adhere to engineering ethics and standards.
4. **GA4.** Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
5. **GA5.** Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community;
6. **GA6.** Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
7. **GA7.** Use techniques, skills and modern engineering tools necessary for engineering practice.
8. **GA8.** 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. **GA9.** Communicate effectively using different modes, tools, and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.
10. **GA10.** Demonstrate leadership qualities, business administration and entrepreneurial skills.

In addition to all engineering graduate attributes defined by NARS 2018, Civil Engineering graduates should be able to:

11. **GA11.** Design of constructions systems that meet specified needs with applicable standards.
12. **GA12.** Understand the concept of quality control during design and construction, field verification, and review.
13. **GA13.** Incorporate economic and business practices into engineering projects.

#### **4. Program Learning Outcomes (PLO's)**

The program courses fulfill the NARS 2018

**Level A:** General Competencies of Engineering Graduate

1. **PLO1.** Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
2. **PLO2.** 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.
3. **PLO3.** 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.
4. **PLO4.** Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.
5. **PLO5.** Practice research techniques and methods of investigation as an inherent part of learning.
6. **PLO6.** Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.
7. **PLO7.** Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.
8. **PLO8.** Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
9. **PLO9.** Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
10. **PLO10.** Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.

**Level B: Competencies of Civil Engineering Graduate**

11. **PLO11.** 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.
12. **PLO12.** 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.

13. **PLO13.** 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.
14. **PLO14.** Deal with biddings, contracts and financial issues including project insurance and guarantees.

## **5. Program Academic Standards**

Academic reference Standards of Civil Engineering Program approved by faculty council on 12/11/2019 – No 385.

## **6. Reference Standards**

National Academic reference Standards of 2018 which were issued by the National Authority for Quality Assurance & Accreditation of Education NAQAAE.

## **7. Program Structure and Contents** (See Matrix 1)

7.1 Program Duration: five years (10 semesters)

7.2 Program Structure:

- Total hours of program: 253 credit hours
- Theoretical: 179 credit hours (contact hours)
- Tut.: 77 contact hours
- Lab.: 90 contact hours
- Compulsory: 245 credit hours
- Elective: 8 credit hours
- Selective: none

### 7.3 Program Courses:

#### 7.3.1 Program Courses VS Requirements (See Matrix 1)

Requirements	University Requirements	Faculty Requirements	Discipline Requirements
Total hours 5 years	7	47	199
% Of hours in 5 years	2.77	18.58	78.66
Reference ratio	Min 8%	Min 20%	Min 35%

#### 7.3.2 Subject Area (See Matrix 2)

Subject Area	Required	Program Total Credit Hours	
		Total hours of five years	% Hours of five years
Humanities and Social Sciences	9-12%	17	6.72
Mathematics and Basic Sciences	20-26%	52	20.55
Basic Engineering Sciences	20-23%	66	26.09
Applied Engineering and Design	20-22%	53	20.95
Computer Applications and ICT	9-11%	23	9.09
Projects and Practice	8-10%	23	9.09
Discretionary	6-8%	19	7.51

## **8. Program Admission Requirements**

Following the below clauses:

### Clause (3)

For obtaining a bachelor's degree in engineering the studying duration is five years, each year is divided into two semesters, starting with a general preparatory year for all students. Then the specialization for the students begins in the second year according to selected courses shown in the regulations.

## **9. Regulations for Progression and Program Completion**

Following the below clauses:

### Clause (9)

The student can transfer to the following academic year with failing subjects if he/she fails in no more than two courses from the previous year. Student is enrolled in the courses of a lower level in addition to at most two additional courses from the group of university required courses. The exam for these failed courses is to be taken with the students of the academic year according to the regular schedule. If the student manages to succeed in the courses he/she will not be graded higher than a "pass" grade with a maximum of 64%.

For the two-part courses, student is considered to succeed the course if he passed the two parts constituting the course. However, if a student fails the course, the exam can be retaken in the part he failed in with the students that part is originally taught. If the student manages to succeed, he will not be graded higher than a "pass" grade with a maximum of 64%. This grade is added to the previous part he passed. The student will be graded "fail" if he/she did not pass one or both parts, and if a student failed both parts and then passed them, he will be graded in both of them with the highest grade in the "pass" grade (64%).

### Clause (10)

Success in all courses is a must before obtaining a bachelor's degree. For students in the fourth year who have failed in no more than two of their curriculum courses and with two additional university requirement courses at most. A second-round exam is held during October in the new academic year, and the student must pass all the failing courses in this exam. Otherwise, the student remains for repetition and must retake the courses which he failed to pass. Also, the grade will not exceed the "pass" grade with a maximum of 64%, and there is no repetition exam for the graduation project.

### Clause (11)

If the exam for one of the courses includes a written exam and another oral or practical part, the student's grade in this course is estimated from the total of the written, oral or practical exams in addition to the work of the term. A student who is absent in the written exam is



considered failed in 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.

Clause (12)

A- The student will be assessed in the exams each academic year, and the total grade will be according to one of the following:

- Excellent: 85% or more of the total score
- Very good: from 75% to less than 85% of the total score
- Good: from 65% to 75% of the total score
- Pass: from 50% to less than 65% of the total score

The student's failure is estimated by one of the following two grades:

- Poor: from 30% to less than 50% of the total score
- Very poor: less than 30% of the total score

B- The student's success grade in the courses he has previously failed in is a "pass" grade with a maximum of 64%.

C- The total grade of students in the bachelor's degree is calculated on the basis of the total grades (cumulative) achieved in all academic years, and the students are ranked according to this total grade.

D- The student is granted honors if his final grade is excellent or at least very good, and his annual grade is not less than very good in any of the academic years except for the preparatory year, and he must not fail any exam in any of the academic years except for the preparatory one.

## 10. Teaching and Learning Methods

Teaching and Learning Methods	
Lecture	
Tutorials	
Computer-based Instruction (computer lab)	
Problem-based Learning	
Project-based Learning	
Interactive Learning	
Presentations	
Report	
Co-operative Learning	
Brainstorming	
Projects	
Simulation	
Discussion	
Practical-based Learning	
Self-Learning	

## 11. Student Assessment (Methods and rules for student assessment)

Assessment Methods	
Tests	Oral Test
	Written Exam
	Experimental
	Quizzes
Reports	
Observation	
Discussions	
Projects	Projects
	Mini Projects
Assignments	
Presentations	

## **12. Program Evaluation**

<b>Evaluator</b>	<b>Tool</b>
Senior Students	Questionnaire-meeting
Graduates	Questionnaire-meeting
Stakeholders	Questionnaire-meeting
Internal Evaluator	Report
External Evaluators	Report

## **13. Courses Specifications**

Courses Specification are approved by faculty council on .....

## 14. Appendix

### 1. Classification of Courses According to Requirement Matrix

Year	Courses		Weekly Contact Hours			Credit Hours of Requirements		
	Code	Course Title	Lect.	Tut.	Lab.	University Requirements	Faculty Requirements	Program Requirements
Preparatory Year	B 1011	Mathematics ( 1 - a )	4	2	0		5	
	B 1012	Mathematics ( 1 - b )	4	2	0		5	
	B 1021	Mechanics ( a )	4	1	1		5	
	B 1022	Mechanics ( b )	4	1	1		5	
	B 1031	Physics ( a )	4	0	2		5	
	B 1032	Physics ( b )	4	0	2		5	
	B 1041	Chemistry ( a )	2	0	2		3	
	B 1042	Chemistry ( b )	2	0	2		3	
	M 1071	Production Eng & Workshops ( a )	2	0	3		3	
	M 1072	Production Eng & Workshops ( b )	0	0	3		1	
	M 1002	Technology & Society	2	0	0		2	
	E1021	Computer Fundamentals and Programming ( a )	0	0	2		1	
	E1022	Computer Fundamentals and Programming ( b )	0	0	2		1	
	M 1061	Eng. Drawing ( a )	0	0	3		1	
	M 1062	Eng. Drawing ( b )	0	0	3		1	
	U 1011	Technical English Language (a)	0	0	2	1		
U 1012	Technical English Language (b)	0	0	2	1			
1st Year	B 1111	Mathematics ( 2 - a )	3	2	0			4
	B 1112	Mathematics ( 2 - b )	3	2	0			4
	C 1111	Structural Analysis (1 a)	3	2	0			4
	C 1112	Structural Analysis (1 b)	3	2	0			4

	C 1121	Properties and Testing of Materials	3	1	1			4
	C 1122	Technology of Building Materials	3	1	1			4
	C 1141	Fluid Mechanics	3	1	1			4
	C 1132	Plane Surveying	3	1	1			4
	E1105	Electrical Engineering Technology	3	1	0			3
	M 1104	Mechanical Engineering Technology	3	1	0			3
	C 1101	Computer Applications (1 - a)	0	0	2			1
	C 1102	Computer Applications (1 - b)	0	0	2			1
	C 1103	Civil Drawing (a)	1	0	2			2
	C 1104	Civil Drawing (b)	1	0	2			2
	C 1105	Engineering Applications (1 - a)	1	0	2			2
	C 1106	Engineering Applications (1- b) *	1	0	2 + 6*			2 + 2*
	U 1111	English language	0	0	2	1		
	U 1122	Human Rights	2	0	0	2		
2nd Year	B 1217	Mathematics ( 5 - a )	3	2	0			4
	B 1218	Mathematics ( 5 - b )	3	2	0			4
	C 1211	Structural Analysis (2 - a)	3	2	0			4
	C 1212	Structural Analysis (2 - b)	3	2	0			4
	C 1221	Concrete Technology	3	2	1			4
	C 1252	Design of Concrete Structures (1)	3	2	0			4
	C 1241	Hydraulics	3	1	1			4
	C 1242	Hydrology	3	2	0			4
	C 1231	Topographic Surveying	3	1	1			4
	C 1208	Architectural Engineering	3	1	1			4
	C 1201	Computer Applications (2 - a)	0	0	3			1
	C 1202	Computer Applications (2 - b)	0	0	3			1
	C 1205	Engineering Applications	1	0	2			2
	C 1206	Engineering Applications	1	0	2			2
	M 1283	Industrial Safety	2	0	0			2

	C 1204	Profession and Society	3	0	0			3
3rd Year	C 1311	Structural Analysis (3)	3	2	0			4
	C 1351	Design of Concrete Structures (2 - a)	3	2	0			4
	C 1352	Design of Concrete Structures (2 - b)	3	2	0			4
	C 1361	Geotechnical Engineering (a)	3	1	1			4
	C 1362	Geotechnical Engineering (b)	3	1	1			4
	C 1371	Design of Steel Structures (1 - a)	3	2	0			4
	C 1372	Design of Steel Structures (1 - b)	3	2	0			4
	C 1331	Photogrammetry and Geodesy	3	1	1			4
	C 1381	Transportation Planning & Traffic Engineering	3	1	1			4
	C 1382	Highway Engineering	3	1	1			4
	C 1342	Irrigation & Drainage Engineering	3	2	1			4
	C 1392	Water Supply Engineering	3	2	1			4
	C 1301	Personal Skills	0	0	2			1
	C 1304	Pollution and Environment	1	0	1			1
	C 1300	Technical Report	0	0	2			1
4th Year	C 1451	Design of Concrete Structures (3)	3	2	0			4
	C 1472	Steel Structures Design (2)	4	2	0			5
	C 1481	Highway and Airport Engineering	3	2	1			4
	C 1461	Design of Foundation (a)	3	2	0			4
	C 1462	Design of Foundation (b)	3	2	0			4
	C 1491	Sewerage	3	2	1			4
	C 1402	Projects Management	3	2	0			4
	C 1441	Design of Irrigation Works	4	2	0			5
	C15**	Elective course (List A)	3	2	0			4
	C15**	Elective course (List B)	3	2	0			4
	C1500	Project	2	0	6			4
	U 1401	Legislations and Contracts	2	0	0	2		
	C 1408	Engineering Economy	1	1	0			1
	C 1400	Field Training	0	0	2		1	

Total hours of five years, Credit Hours				253	7	47	199
Total hours of five years, Contact Hours			179	77	90	<b>346</b>	
Hours of five years, %				100	2.77	18.58	78.66
Reference Ratio					Min 8%	Min 20%	Max 30%

\* 2 Credit hours (6 Contact hours) are added to C 1106 course due to the summer training in the Preparatory Year

**\*\* List of Elective Courses:**

<b>Code</b>	<b>Elective course (List A)</b>	<b>Code</b>	<b>Elective course (List B)</b>
C 1512	Earthquake Engineering and Structural Dynamics	C 1532	The Global Positioning System (GPS)
C 1522	New Construction Materials	C 1534	Remote Sensing
C 1552	Repair and strengthening of Concrete Structures	C 1582	Highway Construction Management and Quality control
C 1554	Special Concrete Structures	C 1584	Simulation Models of Transportation and Traffic
C 1562	Special Foundation	C 1592	Advanced Sanitary Engineering
C 1572	Advanced Steel Structures	C 1594	Modeling of Water & Wastewater Networks

## 2. Classification of Courses According to Subject Area Matrix

Courses		Weekly Contact Hours			Credit Hours of Subject Area						
Code	Course Title	Lect.	Tut.	Lab.	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
U 1011	Technical English Language (a)	0	0	2	1						
U 1012	Technical English Language (b)	0	0	2	1						
U 1111	English language	0	0	2	1						
U 1122	Human Rights	2	0	0	2						
U 1401	Legislations and Contracts	2	0	0	2						
C 1408	Engineering Economy	1	1	0	1						
C 1204	Profession and Society	3	0	0	3						
C 1301	Personal Skills	0	0	2	1						
C 1300	Technical Report	0	0	2	1						
M 1002	Technology & Society	2	0	0	2						
M 1283	Industrial Safety	2	0	0	2						
B 1011	Mathematics ( 1 - a )	4	2	0		5					
B 1012	Mathematics ( 1 - b )	4	2	0		5					
B 1021	Mechanics ( a )	4	1	1		5					
B 1022	Mechanics ( b )	4	1	1		5					
B 1031	Physics ( a )	4	0	2		5					



B 1032	Physics ( b )	4	0	2		5				
B 1041	Chemistry ( a )	2	0	2		3				
B 1042	Chemistry ( b )	2	0	2		3				
B 1111	Mathematics ( 2 - a )	3	2	0		4				
B 1112	Mathematics ( 2 - b )	3	2	0		4				
B 1217	Mathematics ( 5 - a )	3	2	0		4				
B 1218	Mathematics ( 5 - b )	3	2	0		4				
M 1071	Production Eng & Workshops ( a )	2	0	3			3			
M 1072	Production Eng & Workshops ( b )	0	0	3			1			
M 1061	Eng. Drawing ( a )	0	0	3			1			
M 1062	Eng. Drawing ( b )	0	0	3			1			
C 1111	Structural Analysis (1 a)	3	2	0			3		1	
C 1112	Structural Analysis (1 b)	3	2	0			3		1	
C 1121	Properties and Testing of Materials	3	1	1			4			
C 1122	Technology of Building Materials	3	1	1			4			
C 1141	Fluid Mechanics	3	1	1			3		1	
C 1132	Plane Surveying	3	1	1			4			
C 1103	Civil Drawing (a)	1	0	2			2			
C 1104	Civil Drawing (b)	1	0	2			2			
C 1211	Structural Analysis (2 - a)	3	2	0			3		1	
C 1212	Structural Analysis (2 - b)	3	2	0			3		1	
C 1221	Concrete Technology	3	2	1			4			
C 1241	Hydraulics	3	1	1			3		1	
C 1231	Topographic Surveying	3	1	1			4			
C 1311	Structural Analysis (3)	3	2	0			3		1	
C 1331	Photogrammetry and Geodesy	3	1	1			4			
C 1242	Hydrology	3	2	0			3		1	
C 1361	Geotechnical Engineering (a)	3	1	1			4			
C 1362	Geotechnical Engineering (b)	3	1	1			4			

C 1252	Design of Concrete Structures (1)	3	2	0				3	1		
C 1351	Design of Concrete Structures (2 -a)	3	2	0				3	1		
C 1352	Design of Concrete Structures (2 - b)	3	2	0				3	1		
C 1371	Design of Steel Structures (1 - a)	3	2	0				3	1		
C 1372	Design of Steel Structures (1 - b)	3	2	0				3	1		
C 1381	Transportation Planning & Traffic Engineering	3	1	1				3		1	
C 1382	Highway Engineering	3	1	1				3	1		
C 1342	Irrigation & Drainage Engineering	3	2	1				3	1		
C 1392	Water Supply Engineering	3	2	1				3		1	
C 1451	Design of Concrete Structures (3)	3	2	0				3		1	
C 1472	Steel Structures Design (2)	4	2	0				4	1		
C 1481	Highway and Airport Engineering	3	2	1				3		1	
C 1461	Design of Foundation (a)	3	2	0				3		1	
C 1462	Design of Foundation (b)	3	2	0				3		1	
C 1491	Sewerage	3	2	1				3		1	
C 1441	Design of Irrigation Works	4	2	0				4		1	
C 1402	Projects Management	3	2	0				3	1		
E1021	Computer Fundamentals and Programming ( a )	0	0	2					1		
E1022	Computer Fundamentals and Programming ( b )	0	0	2					1		
C 1101	Computer Applications (1 - a)	0	0	2					1		
C 1102	Computer Applications (1 - b)	0	0	2					1		
C 1201	Computer Applications (2 - a)	0	0	3					1		
C 1202	Computer Applications (2 - b)	0	0	3					1		
C 1105	Engineering Applications (1 - a)	1	0	2						2	
C 1106	Engineering Applications (1- b)	1	0	2+ 6*						4	
C 1205	Engineering Applications	1	0	2						2	

C 1206	Engineering Applications	1	0	2						2	
C1500	Project	2	0	6						4	
C 1400	Field Training	0	0	2						1	
C15**	Elective course (List A)	3	2	0							4
C15**	Elective course (List B)	3	2	0							4
E1105	Electrical Engineering Technology	3	1	0							3
M 1104	Mechanical Engineering Technology	3	1	0							3
C 1208	Architectural Engineering	3	1	1							4
C 1304	Pollution and Environment	1	0	1							1
Total hours of five year = 253 Credit Hours					17	52	66	53	23	23	19
% Hours of five years					6.72	20.55	26.09	20.95	9.09	9.09	7.51
Reference Ratio from NARS					9-12%	20-26%	20-23%	20-22%	9-11%	8-10%	6-8%

### 3. Faculty Mission vs. Program Mission Matrix

Faculty Mission		Program Mission		
		The mission of the civil engineering program is to develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership. The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools. The program focuses on professional practices in civil engineering preparing its graduates for the labor market, societal needs, while equipping them with lifelong learning skills.		
		The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools.	The program focuses on professional practices in civil engineering preparing its graduates for the labor market	Develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership.
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			√

**4. Faculty Mission vs. NARS 2018 CBE Matrix**

Faculty Mission		NARS 2018 CBE													
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4
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		√	√	√	√					√	√	√	√	√

**5. Program Mission vs. Program Objectives Matrix**

Program Mission		Program Objectives						
		PO1	PO2	PO3	PO4	PO5	PO6	PO7
<p>The mission of the civil engineering program is to develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership. The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools. The program focuses on professional practices in civil engineering preparing its graduates for the labor market, societal needs, while equipping them with lifelong learning skills.</p>	<p>The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools.</p>	√			√			√
	<p>The program focuses on professional practices in civil engineering preparing its graduates for the labor market</p>		√	√		√	√	
	<p>Develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership.</p>		√	√		√		

**6. Program Objectives vs. NARS 2018 CBE Matrix**

Program Objectives	NARS 2018 CBE													
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4
PO1	√	√							√		√			
PO2			√				√							
PO3						√	√	√	√					
PO4				√				√		√		√		
PO5					√			√		√				
PO6			√	√		√					√	√	√	
PO7			√						√					√

**7. 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											√	√	

PO7														√
-----	--	--	--	--	--	--	--	--	--	--	--	--	--	---

**8. Program Objectives vs. Requirements Matrix**

Program Objectives	Requirements		
	University	Faculty	Discipline
PO1		√	
PO2			√
PO3			√
PO4		√	
PO5	√		
PO6			√
PO7			√

**9. Program Objectives vs. Subject Area Matrix**

Program Objectives	Subject Area						
	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
PO1	√	√	√	√	√	√	
PO2	√		√	√		√	
PO3	√					√	
PO4	√	√	√	√	√	√	√
PO5	√	√	√	√	√	√	√



<b>PO6</b>				√		√	√
<b>PO7</b>	√					√	√

**10. Student Competences vs. NARS 2018 CBE Matrix**

Student Competences	NARS 2018 CBE													
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B11	B12	B13	B14
<b>A1</b>	√													
<b>A2</b>		√												
<b>A3</b>			√											
<b>A4</b>				√										
<b>A5</b>					√									
<b>A6</b>						√								
<b>A7</b>							√							
<b>A8</b>								√						
<b>A9</b>									√					
<b>A10</b>										√				
<b>B1</b>											√			
<b>B2</b>												√		
<b>B3</b>													√	
<b>B4</b>														√

**11. Student Competences vs. Program Learning Outcomes Matrix**

Student Competences	Program Learning Outcomes													
	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
A1	√													
A2		√												
A3			√											
A4				√										
A5					√									
A6						√								
A7							√							
A8								√						
A9									√					
A10										√				
B1											√			
B2												√		
B3													√	
B4														√

**12. Student Competences vs. Graduate Attributes Matrix**

Student Competences	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													√

### 13. Graduate Attributes vs. Requirements Matrix

Graduate Attributes	Requirements		
	University	Faculty	Discipline
GA1	√	√	√
GA2	√	√	√
GA3		√	√
GA4	√		√
GA5		√	√
GA6		√	√
GA7		√	√
GA8	√		√
GA9	√		√
GA10	√		√
GA11			√
GA12			√
GA13			√

**14. Graduate Attributes vs. Subject Area Matrix**

Graduate Attributes	Subject Area						
	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
GA1	√	√	√	√	√		
GA2	√	√	√	√	√	√	√
GA3		√	√	√		√	√
GA4	√					√	
GA5				√		√	√
GA6		√		√		√	√
GA7			√	√	√	√	√
GA8	√	√	√	√	√	√	√
GA9	√	√	√		√		
GA10	√					√	√
GA11				√		√	√
GA12				√	√	√	√
GA13						√	√

### 15. Student Competences Vs. Learning and Teaching Methods Matrix

Teaching and Learning Methods	Student Competences													
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4
<b>Conventional teaching methods</b>														
Lecture	√		√	√		√		√			√	√	√	√
Tutorials	√		√	√		√		√			√	√	√	√
Computer-based Instruction		√									√	√		
Design Studio			√						√					
Practical-based Learning		√				√	√		√		√	√		
<b>Unconventional teaching methods</b>														
Problem-based Learning	√			√					√		√	√	√	√
Project-based Learning			√			√	√		√		√	√	√	√
Interactive Learning							√				√	√	√	√
Presentations			√		√				√		√	√	√	√
Report					√		√		√	√	√	√	√	√
Co-operative Learning					√						√	√	√	√
Brainstorming							√	√	√		√	√	√	√
Projects			√			√	√	√	√		√	√	√	√
Simulation		√									√	√	√	
Discussion	√		√					√			√	√	√	√
Self-Learning					√					√	√	√	√	√

### 16. Student Competencies Vs Assessment Methods Matrix

Assessment Methods		Student Competences													
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4
<b>Formative assessment methods</b>															
Tests	Oral Test	√	√	√		√	√	√	√	√	√	√	√	√	√
	Written Exam	√		√	√		√		√			√	√	√	√
	Experimental		√					√				√	√		
	Quizzes	√		√	√		√		√			√	√	√	√
Assignments		√	√	√	√		√		√	√		√	√	√	√
Presentations				√		√	√	√		√	√	√	√	√	√
Reports		√		√		√	√	√	√	√	√	√	√	√	√
Observation		√			√	√		√	√	√		√	√	√	√
Discussions		√		√	√	√	√	√	√	√	√	√	√	√	√
Projects	Projects	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Mini Projects	√	√	√		√	√	√	√	√	√	√	√	√	√
<b>Summative Assessment Method</b>															
Practical			√					√				√	√		
Oral Exam		√	√	√		√	√	√	√	√	√	√	√	√	√
Final Exam		√		√	√		√		√			√	√	√	√

17. Assessment Methods Vs. Teaching and Learning Methods Matrix

Assessment Methods		Teaching and Learning Methods																	
		Lecture	Tutorials	Computer-based Instruction	Design Studio	Problem-based Learning	Project-based Learning	Interactive Learning	Presentations	Case Study	Report	Co-operative Learning	Brainstorming	Projects	Simulation	Discussion	Practical-based Learning	Self-Learning	Hybrid Learning
<b>Formative Assessment Method</b>																			
Tests	Oral Test						√		√	√	√			√		√	√	√	√
	Written Exam	√	√																√
	Experimental			√													√		
	Quizzes	√	√																√
Reports									√		√					√		√	√
Observation						√		√			√	√							
Discussions		√	√		√	√	√		√	√	√	√	√		√				√
Projects	Projects				√	√		√	√	√	√		√	√	√	√	√	√	√
	Mini Projects				√		√	√		√		√		√	√	√	√		√
Assignments			√	√	√	√													√
Presentations							√		√	√	√			√					√
<b>Summative Assessment Method</b>																			
Practical				√													√		
Oral Exam							√							√		√	√	√	√
Final Exam		√	√			√									√		√	√	√



### 18. Courses Vs. Program Learning Outcomes Matrix

Year	Code	Course Title	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14	TOTAL	
Preparatory Year	B 1011	Mathematics (1 - a)	1	1													2	
	B 1012	Mathematics (1 - b)	1	1													2	
	B 1021	Mechanics (a)	1	1													2	
	B 1022	Mechanics (b)	1	1													2	
	B 1031	Physics (a)	1	1													2	
	B 1032	Physics (b)	1	1													2	
	B 1041	Chemistry (a)	1	1													2	
	B 1042	Chemistry (b)	1	1													2	
	M 1071	Production Eng. & Workshops (a)				1		1										2
	M 1072	Production Eng. & Workshops (b)				1												1
	M 1002	Technology & Society								1			1					2
	E1021	Computer Fundamentals and Programming (a)				1							1					2
	E1022	Computer Fundamentals and Programming (b)				1							1					2
	M 1061	Eng. Drawing (a)							1		1							2
	M 1062	Eng. Drawing (b)							1		1							2
	U 1011	Technical English Language (a)						1			1		1					3
	U 1012	Technical English Language (b)						1			1		1					3
1st Year	B 1111	Mathematics (2 - a)	1	1													2	
	B 1112	Mathematics (2 - b)	1	1													2	
	C 1111	Structural Analysis (1 a)	1											1			2	
	C 1112	Structural Analysis (1 b)	1											1			2	

	C 1121	Properties and Testing of Materials		1								1				2
	C 1122	Technology of Building Materials		1								1		1		3
	C 1141	Fluid Mechanics		1								1				2
	C 1132	Plane Surveying		1			1					1				3
	E1105	Electrical Engineering Technology	1		1											2
	M 1104	Mechanical Engineering Technology	1		1											2
	C 1101	Computer Applications (1 - a)					1							1		2
	C 1102	Computer Applications (1 - b)					1							1		2
	C 1103	Civil Drawing (a)						1		1						2
	C 1104	Civil Drawing (b)						1		1						2
	C 1105	Engineering Applications (1 - a)						1					1			2
	C 1106	Engineering Applications (1- b)						1					1			2
	U 1111	English language					1			1		1				3
	U 1122	societal issues							1			1				2
	2nd Year	B 1217	Mathematics (5 - a)	1	1											
B 1218		Mathematics (5 - b)	1	1												2
C 1211		Structural Analysis (2 - a)	1									1				2
C 1212		Structural Analysis (2 - b)	1									1				2
C 1221		Concrete Technology		1								1		1		3
C 1252		Design of Concrete Structures (1)			1	1								1		3
C 1241		Hydraulics		1								1				2
C 1242		Hydrology	1									1				2
C 1231		Topographic Surveying		1			1					1				3
C 1208		Architectural Engineering					1			1						2
C 1201		Computer Applications (2 - a)		1										1		2
C 1202		Computer Applications (2 - b)		1										1		2
C 1205		Engineering Applications						1					1			2

	C 1206	Engineering Applications						1					1				2	
	M 1283	Industrial Safety	1		1	1											3	
	C 1204	Profession and Society				1	1		1			1					4	
3rd Year	C 1311	Structural Analysis (3)	1										1				2	
	C 1351	Design of Concrete Structures (2 - a)			1	1								1			3	
	C 1352	Design of Concrete Structures (2 - b)			1	1									1		3	
	C 1361	Geotechnical Engineering (a)		1									1				2	
	C 1362	Geotechnical Engineering (b)		1									1				2	
	C 1371	Design of Steel Structures (1 - a)			1	1									1		3	
	C 1372	Design of Steel Structures (1 - b)			1	1									1		3	
	C 1331	Photogrammetry and Geodesy		1			1							1				3
	C 1381	Transportation Planning & Traffic Engineering					1								1	1		3
	C 1382	Highway Engineering		1		1									1			3
	C 1342	Irrigation & Drainage Engineering	1												1			2
	C 1392	Water Supply Engineering		1											1			2
	C 1301	Personal Skills								1	1							2
	C 1304	Pollution and Environment				1										1		2
C 1300	Technical Report					1			1	1							2	
4th Year	C 1451	Design of Concrete Structures (3)			1	1									1		3	
	C 1472	Steel Structures Design (2)			1	1									1		3	
	C 1481	Highway and Airport Engineering													1	1	2	
	C 1461	Design of Foundation (a)			1										1		2	
	C 1462	Design of Foundation (b)			1										1		2	
	C 1491	Sewerage		1											1		2	
	C 1402	Projects Management	1					1								1	3	
	C 1441	Design of Irrigation Works													1	1	2	
	C15**	Elective course (List A)																**

	C15**	Elective course (List B)														**	
	C1500	Project			1		1		1	1		1		1		1	7
	1	Legislations and Contracts												1	1		2
	C 1408	Engineering Economy									1					1	2
	C 1400	Field Training					1	1	1		1	1					5
<b>**Elective Courses</b>																	
<b>Elective course (List A)</b>	C 1512	Earthquake Engineering and Structural Dynamics					1						1				2
	C 1522	New Construction Materials		1									1		1		3
	C 1552	Repair and strengthening of Concrete Structures					1								1		2
	C 1554	Special Concrete Structures			1									1			2
	C 1562	Special Foundation			1									1			2
	C 1572	Advanced Steel Structures			1	1								1			3
<b>Elective course (List B)</b>	C 1532	The Global Positioning System (GPS)		1									1				2
	C 1534	Remote Sensing		1									1				2
	C 1582	Highway Construction Management and Quality control						1						1	1		2
	C 1584	Simulation Models of Transportation and Traffic												1	1		2
	C 1592	Advanced Sanitary Engineering												1	1		2
	C 1594	Modeling of Water & Wastewater Networks		1										1			2

### 19. Courses Vs. Program Objectives Matrix

Year	Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Preparatory Year	B 1011	Mathematics (1 - a)	1						
	B 1012	Mathematics (1 - b)	1						
	B 1021	Mechanics (a)	1						
	B 1022	Mechanics (b)	1						
	B 1031	Physics (a)	1						
	B 1032	Physics (b)	1						
	B 1041	Chemistry (a)	1						
	B 1042	Chemistry (b)	1						
	M 1071	Production Eng. & Workshops (a)				1		1	
	M 1072	Production Eng. & Workshops (b)				1			
	M 1002	Technology & Society		1					
	E1021	Computer Fundamentals and Programming (a)				1			
	E1022	Computer Fundamentals and Programming (b)				1			
	M 1061	Eng. Drawing (a)		1	1				
	M 1062	Eng. Drawing (b)		1	1				
	U 1011	Technical English Language (a)						1	
	U 1012	Technical English Language (b)						1	
	1st Year	B 1111	Mathematics (2 - a)	1					
B 1112		Mathematics (2 - b)	1						
C 1111		Structural Analysis (1 a)	1						
C 1112		Structural Analysis (1 b)	1						
C 1121		Properties and Testing of Materials	1					1	
C 1122		Technology of Building Materials	1					1	
C 1141		Fluid Mechanics	1						
C 1132		Plane Surveying	1				1		
E1105		Electrical Engineering Technology	1					1	
M 1104		Mechanical Engineering Technology	1	1					
C 1101		Computer Applications (1 - a)				1			
C 1102		Computer Applications (1 - b)				1			
C 1103		Civil Drawing (a)				1		1	
C 1104		Civil Drawing (b)				1		1	
C 1105		Engineering Applications (1 - a)	1					1	
C 1106		Engineering Applications (1- b)	1					1	
U 1111		English language							

	U 1122	societal issues							
2nd Year	B 1217	Mathematics (5 - a)	1						
	B 1218	Mathematics (5 - b)	1						
	C 1211	Structural Analysis (2 - a)	1					1	
	C 1212	Structural Analysis (2 - b)	1					1	
	C 1221	Concrete Technology	1					1	
	C 1252	Design of Concrete Structures (1)		1		1		1	
	C 1241	Hydraulics						1	
	C 1242	Hydrology	1						
	C 1231	Topographic Surveying	1			1			
	C 1208	Architectural Engineering					1		
	C 1201	Computer Applications (2 - a)	1					1	
	C 1202	Computer Applications (2 - b)	1					1	
	C 1205	Engineering Applications	1					1	
	C 1206	Engineering Applications	1					1	
	M 1283	Industrial Safety	1	1		1			
	C 1204	Profession and Society			1	1	1		
3rd Year	C 1311	Structural Analysis (3)	1						
	C 1351	Design of Concrete Structures (2 - a)		1		1		1	
	C 1352	Design of Concrete Structures (2 - b)		1		1		1	
	C 1361	Geotechnical Engineering (a)	1						
	C 1362	Geotechnical Engineering (b)	1						
	C 1371	Design of Steel Structures (1 - a)		1				1	
	C 1372	Design of Steel Structures (1 - b)		1				1	
	C 1331	Photogrammetry and Geodesy	1				1		
	C 1381	Transportation Planning & Traffic Engineering					1	1	
	C 1382	Highway Engineering	1			1		1	
	C 1342	Irrigation & Drainage Engineering						1	
	C 1392	Water Supply Engineering	1					1	
	C 1301	Personal Skills			1		1		
	C 1304	Pollution and Environment				1		1	
	C 1300	Technical Report			1		1		
4th Year	C 1451	Design of Concrete Structures (3)		1		1		1	
	C 1472	Steel Structures Design (2)		1				1	
	C 1481	Highway and Airport Engineering						1	
	C 1461	Design of Foundation (a)		1				1	
	C 1462	Design of Foundation (b)		1				1	
	C 1491	Sewerage		1				1	

	C 1402	Projects Management							
	C 1441	Design of Irrigation Works						1	
	C15**	Elective course (List A)							
	C15**	Elective course (List B)							
	C1500	Project		1	1	1	1	1	1
	U 1401	Legislations and Contracts						1	1
	C 1408	Engineering Economy			1				1
	C 1400	Field Training			1		1		
<b>**Elective Courses</b>									
<b>Elective course (List A)</b>	C 1512	Earthquake Engineering and Structural Dynamics	1				1		
	C 1522	New Construction Materials	1						1
	C 1552	Repair and strengthening of Concrete Structures					1	1	
	C 1554	Special Concrete Structures		1				1	1
	C 1562	Special Foundation						1	
	C 1572	Advanced Steel Structures		1				1	
<b>Elective course (List B)</b>	C 1532	The Global Positioning System (GPS)	1						
	C 1534	Remote Sensing	1						
	C 1582	Highway Construction Management and Quality control				1		1	
	C 1584	Simulation Models of Transportation and Traffic						1	
	C 1592	Advanced Sanitary Engineering						1	
	C 1594	Modeling of Water & Wastewater Networks	1					1	

## 20. Courses Vs. Teaching and Learning Methods Matrix

Year	Code	Course Title	Lecture	Tutorials	Computer-based Instruction	Design Studio	Problem-based Learning	Project-based Learning	Interactive Learning	Presentations	Report	Co-operative Learning	Brainstorming	Projects	Simulation	Discussion	Practical-based Learning	Self-Learning	Hybrid Learning
Preparatory Year	B 1011	Mathematics (1 - a)	1	1			1												
	B 1012	Mathematics (1 - b)	1	1			1												
	B 1021	Mechanics (a)	1	1															
	B 1022	Mechanics (b)	1	1															
	B 1031	Physics (a)	1	1													1		
	B 1032	Physics (b)	1	1													1		
	B 1041	Chemistry (a)	1	1													1		
	B 1042	Chemistry (b)	1	1													1		
	M 1071	Production Eng. & Workshops (a)	1	1			1				1			1		1			
	M 1072	Production Eng. & Workshops (b)		1							1			1					
	M 1002	Technology & Society	1								1					1		1	
	E1021	Computer Fundamentals and Programming (a)			1		1												
	E1022	Computer Fundamentals and Programming (b)			1		1												
	M 1061	Eng. Drawing (a)	1			1											1		
	M 1062	Eng. Drawing (b)	1			1											1		
	U 1011	Technical English Language (a)	1														1		
	U 1012	Technical English Language (b)	1			1	1			1							1		



1st Year	B 1111	Mathematics (2 - a)	1	1		1													
	B 1112	Mathematics (2 - b)	1	1		1													
	C 1111	Structural Analysis (1 a)	1	1															
	C 1112	Structural Analysis (1 b)	1	1															
	C 1121	Properties and Testing of Materials	1	1															1
	C 1122	Technology of Building Materials	1	1															1
	C 1141	Fluid Mechanics	1	1															1
	C 1132	Plane Surveying	1	1							1								1
	E1105	Electrical Engineering Technology	1	1							1							1	
	M 1104	Mechanical Engineering Technology	1	1							1								
	C 1101	Computer Applications (1 - a)				1													
	C 1102	Computer Applications (1 - b)				1			1										
	C 1103	Civil Drawing (a)	1	1					1										
	C 1104	Civil Drawing (b)	1	1					1										
	C 1105	Engineering Applications (1 - a)	1	1															1
	C 1106	Engineering Applications (1- b)	1	1															1
	U 1111	English language																	
	U 1122	societal issues																	
2nd Year	B 1217	Mathematics (5 - a)	1	1			1												
	B 1218	Mathematics (5 - b)	1	1			1												
	C 1211	Structural Analysis (2 - a)	1	1															
	C 1212	Structural Analysis (2 - b)	1	1														1	
	C 1221	Concrete Technology	1	1															1
	C 1252	Design of Concrete Structures (1)	1	1					1										
	C 1241	Hydraulics	1	1					1										1
	C 1242	Hydrology	1	1												1			
	C 1231	Topographic Surveying	1	1			1		1		1	1							1
	C 1208	Architectural Engineering	1	1						1					1				1

	C 1201	Computer Applications (2 - a)			1										1					
	C 1202	Computer Applications (2 - b)			1															
	C 1205	Engineering Applications	1	1														1		
	C 1206	Engineering Applications	1	1														1		
	M 1283	Industrial Safety	1	1												1				
	C 1204	Profession and Society	1							1	1									
3rd Year	C 1311	Structural Analysis (3)	1	1																
	C 1351	Design of Concrete Structures (2 - a)	1	1				1												
	C 1352	Design of Concrete Structures (2 - b)	1	1				1												
	C 1361	Geotechnical Engineering (a)	1	1															1	
	C 1362	Geotechnical Engineering (b)	1	1															1	
	C 1371	Design of Steel Structures (1 - a)	1	1																
	C 1372	Design of Steel Structures (1 - b)	1	1							1									
	C 1331	Photogrammetry and Geodesy	1	1																1
	C 1381	Transportation Planning & Traffic Engineering	1	1									1							1
	C 1382	Highway Engineering	1	1				1												1
	C 1342	Irrigation & Drainage Engineering	1	1							1									
	C 1392	Water Supply Engineering	1	1				1												1
	C 1301	Personal Skills	1							1	1									1
	C 1304	Pollution and Environment	1	1				1												1
C 1300	Technical Report		1						1	1										
4th Year	C 1451	Design of Concrete Structures (3)	1	1				1												
	C 1472	Steel Structures Design (2)	1	1																
	C 1481	Highway and Airport Engineering	1	1				1												1
	C 1461	Design of Foundation (a)	1	1				1												
	C 1462	Design of Foundation (b)	1	1				1			1									
	C 1491	Sewerage	1	1				1												1

	C 1402	Projects Management																	
	C 1441	Design of Irrigation Works	1	1						1									
	C15**	Elective course (List A)																	
	C15**	Elective course (List B)																	
	C1500	Project	1	1	1		1			1		1	1					1	
	U 1401	Legislations and Contracts	1	1															
	C 1408	Engineering Economy	1	1						1	1								
	C 1400	Field Training								1								1	
<b>**Elective Courses</b>																			
<b>Elective course (List A)</b>	C 1512	Earthquake Engineering and Structural Dynamics	1	1															
	C 1522	New Construction Materials	1	1															
	C 1552	Repair and strengthening of Concrete Structures	1	1						1									
	C 1554	Special Concrete Structures	1	1															
	C 1562	Special Foundation	1	1						1									
	C 1572	Advanced Steel Structures	1	1						1									
<b>Elective course (List B)</b>	C 1532	The Global Positioning System (GPS)	1	1	1														
	C 1534	Remote Sensing	1	1						1									
	C 1582	Highway Construction Management and Quality control	1	1						1									
	C 1584	Simulation Models of Transportation and Traffic	1	1				1											
	C 1592	Advanced Sanitary Engineering	1	1															
	C 1594	Modeling of Water & Wastewater Networks	1	1															

## 21. Courses Vs. Assessment Method Matrix

Year	Code	Course Title	Formative Assessment Method										Summative Assessment Method			
			Tests				Reports	Observation	Discussions	Projects		Assignments	Presentations	Practical	Oral Exam	Final Exam
			Oral Test	Written Exam	Experimental	Quizzes				Projects	Mini Projects					
Preparatory Year	B 1011	Mathematics (1 - a)		1		1			1							1
	B 1012	Mathematics (1 - b)		1		1					1					1
	B 1021	Mechanics (a)	1	1		1					1					1
	B 1022	Mechanics (b)	1	1		1					1					1
	B 1031	Physics (a)		1	1	1										1
	B 1032	Physics (b)		1		1							1			1
	B 1041	Chemistry (a)		1	1											1
	B 1042	Chemistry (b)		1	1											1
	M 1071	Production Eng. & Workshops (a)		1			1		1	1						1
	M 1072	Production Eng. & Workshops (b)					1			1				1		
	M 1002	Technology & Society	1	1												1
	E1021	Computer Fundamentals and Programming (a)		1		1						1				1
	E1022	Computer Fundamentals and Programming (b)		1		1						1				1
	M 1061	Eng. Drawing (a)		1								1				1
	M 1062	Eng. Drawing (b)		1								1				1
	U 1011	Technical English Language (a)		1								1				1
U 1012	Technical English Language (b)		1								1				1	
1st Year	B 1111	Mathematics (2 - a)		1		1			1						1	

	B 1112	Mathematics (2 - b)		1		1			1						1	
	C 1111	Structural Analysis (1 a)		1		1									1	
	C 1112	Structural Analysis (1 b)		1		1									1	
	C 1121	Properties and Testing of Materials	1	1	1										1	
	C 1122	Technology of Building Materials	1	1	1							1			1	
	C 1141	Fluid Mechanics	1	1	1	1									1	
	C 1132	Plane Surveying		1			1		1					1	1	1
	E1105	Electrical Engineering Technology		1		1	1		1							1
	M 1104	Mechanical Engineering Technology		1		1	1					1				1
	C 1101	Computer Applications (1 - a)				1						1		1		
	C 1102	Computer Applications (1 - b)				1					1			1		
	C 1103	Civil Drawing (a)	1	1	1						1	1		1		
	C 1104	Civil Drawing (b)	1	1	1						1	1		1		
	C 1105	Engineering Applications (1 - a)		1			1					1		1	1	
	C 1106	Engineering Applications (1- b)		1			1					1		1	1	
	U 1111	English language														
	U 1122	societal issues														
2nd Year	B 1217	Mathematics (5 - a)		1		1			1						1	
	B 1218	Mathematics (5 - b)		1		1			1						1	
	C 1211	Structural Analysis (2 - a)	1	1								1			1	
	C 1212	Structural Analysis (2 - b)		1		1						1			1	
	C 1221	Concrete Technology	1	1	1							1			1	
	C 1252	Design of Concrete Structures (1)		1					1		1	1			1	
	C 1241	Hydraulics	1	1	1						1	1			1	
	C 1242	Hydrology	1	1		1					1				1	
	C 1231	Topographic Surveying		1			1	1	1					1	1	1
	C 1208	Architectural Engineering		1						1		1				1

	C 1201	Computer Applications (2 - a)		1		1							1		
	C 1202	Computer Applications (2 - b)		1		1					1		1		
	C 1205	Engineering Applications		1		1					1		1	1	
	C 1206	Engineering Applications		1		1					1		1	1	
	M 1283	Industrial Safety		1			1								1
	C 1204	Profession and Society		1			1					1			1
3rd Year	C 1311	Structural Analysis (3)		1		1					1	1			1
	C 1351	Design of Concrete Structures (2 - a)	1	1							1	1			1
	C 1352	Design of Concrete Structures (2 - b)		1					1		1	1			1
	C 1361	Geotechnical Engineering (a)	1	1	1							1			1
	C 1362	Geotechnical Engineering (b)	1	1	1	1						1			1
	C 1371	Design of Steel Structures (1 - a)		1		1						1			1
	C 1372	Design of Steel Structures (1 - b)		1		1						1			1
	C 1331	Photogrammetry and Geodesy	1	1	1										1
	C 1381	Transportation Planning & Traffic Engineering	1	1					1		1	1			1
	C 1382	Highway Engineering		1	1						1	1			1
	C 1342	Irrigation & Drainage Engineering	1	1			1					1			1
	C 1392	Water Supply Engineering		1	1	1					1	1			1
	C 1301	Personal Skills					1		1				1		1
	C 1304	Pollution and Environment		1		1						1			1
C 1300	Technical Report					1						1		1	
4th Year	C 1451	Design of Concrete Structures (3)	1	1							1	1			1
	C 1472	Steel Structures Design (2)		1		1						1			1
	C 1481	Highway and Airport Engineering	1	1	1						1	1			1
	C 1461	Design of Foundation (a)		1		1					1	1			1
	C 1462	Design of Foundation (b)		1		1	1				1	1			1
	C 1491	Sewerage		1	1	1					1	1			1

	C 1402	Projects Management															
	C 1441	Design of Irrigation Works	1	1		1	1				1						1
	C15**	Elective course (List A)															
	C15**	Elective course (List B)															
	C1500	Project								1						1	
	U 1401	Legislations and Contracts	1	1							1	1					1
	C 1408	Engineering Economy		1		1	1					1	1				1
	C 1400	Field Training					1						1			1	
<b>**Elective Courses</b>																	
<b>Elective course (List A)</b>	C 1512	Earthquake Engineering and Structural Dynamics		1		1						1					1
	C 1522	New Construction Materials	1	1								1					1
	C 1552	Repair and strengthening of Concrete Structures	1	1			1					1					1
	C 1554	Special Concrete Structures		1		1			1								
	C 1562	Special Foundation		1			1					1					1
	C 1572	Advanced Steel Structures		1		1	1					1					1
<b>Elective course (List B)</b>	C 1532	The Global Positioning System (GPS)		1			1					1					1
	C 1534	Remote Sensing		1		1	1										1
	C 1582	Highway Construction Management and Quality control	1	1					1			1					1
	C 1584	Simulation Models of Transportation and Traffic	1	1							1	1					1
	C 1592	Advanced Sanitary Engineering		1		1						1					1
	C 1594	Modeling of Water & Wastewater Networks		1		1						1					1