Ministry of Higher Education and Scientific Research

University of Thi-Qar
College of Engineering
Civil Engineering Department

وزارة التعليم العالي و البحث العلمي

جامعة ذي قار كلية الهندسة

قسم الهندسة المدنيـــــــــة

Self-Assessment Report For B.SC in Civil Engineering Department

At

University of Thi-Qar

Nsseriyah, Iraq

September 2021-2022

Prepared by

Civil Engineering Department

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BACKGROUND INFORMATION

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B. Program history

The thought of the establishing college of engineering in Thi-qar University started in 2000 where the university begun to employ engineers and teachers. At 2003, civil engineering department was founded besides mechanical engineering department in the same year. The need to open this college appears due to two main reasons; the first is the need of our province, Thi-qar, for engineers and professional workers, which belong to the high increase in construction of building after 2003 and also the increase of the secondary school graduates.

The civil engineering department followed the Ministry of Higher Education in its programs and their curriculum is approximately same as of Baghdad University. The

curriculum have been developed in 2017-2018 to fulfill the requirement of ABET. They study in the program became in two courses. Civil engineering department has been continuously graduating since 2006. The first time that self-assessment report is written in 2011. This report is written also following the Ministry of Higher Education orders and due to the ruddiness of our college to enjoy in the accreditation process.

C. Options

The civil engineering program followed a one track-system. It does not include any options, tracks, or concentrations within the major.

D. Degree Titles

Civil engineering in the college of engineering awards only the degree of Bachelor of Science in Civil Engineering (BSC)

E. Organizational Structure

The organization structure for the president to the department is shown in Figure 1. The college organization details are presented in Figure 2. Figure 3 shows the civil engineering department organization.

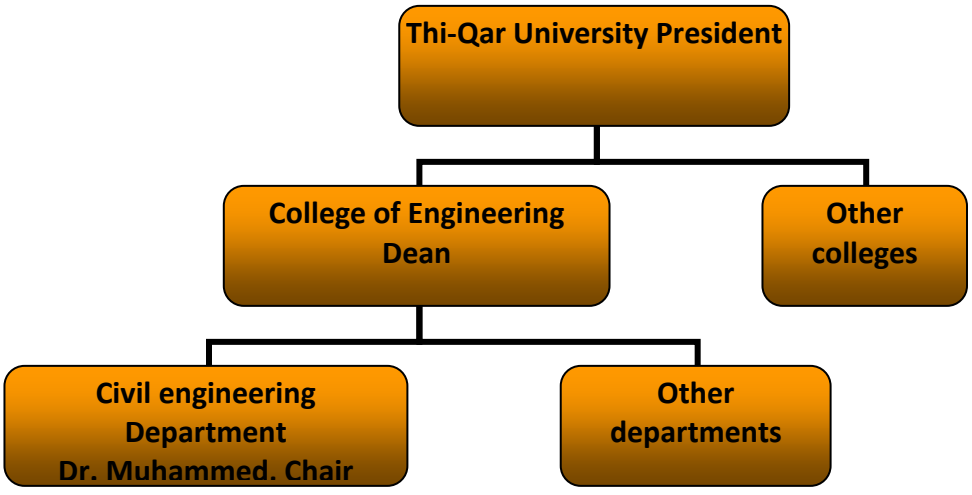


Figure 1 Partial organizational chart

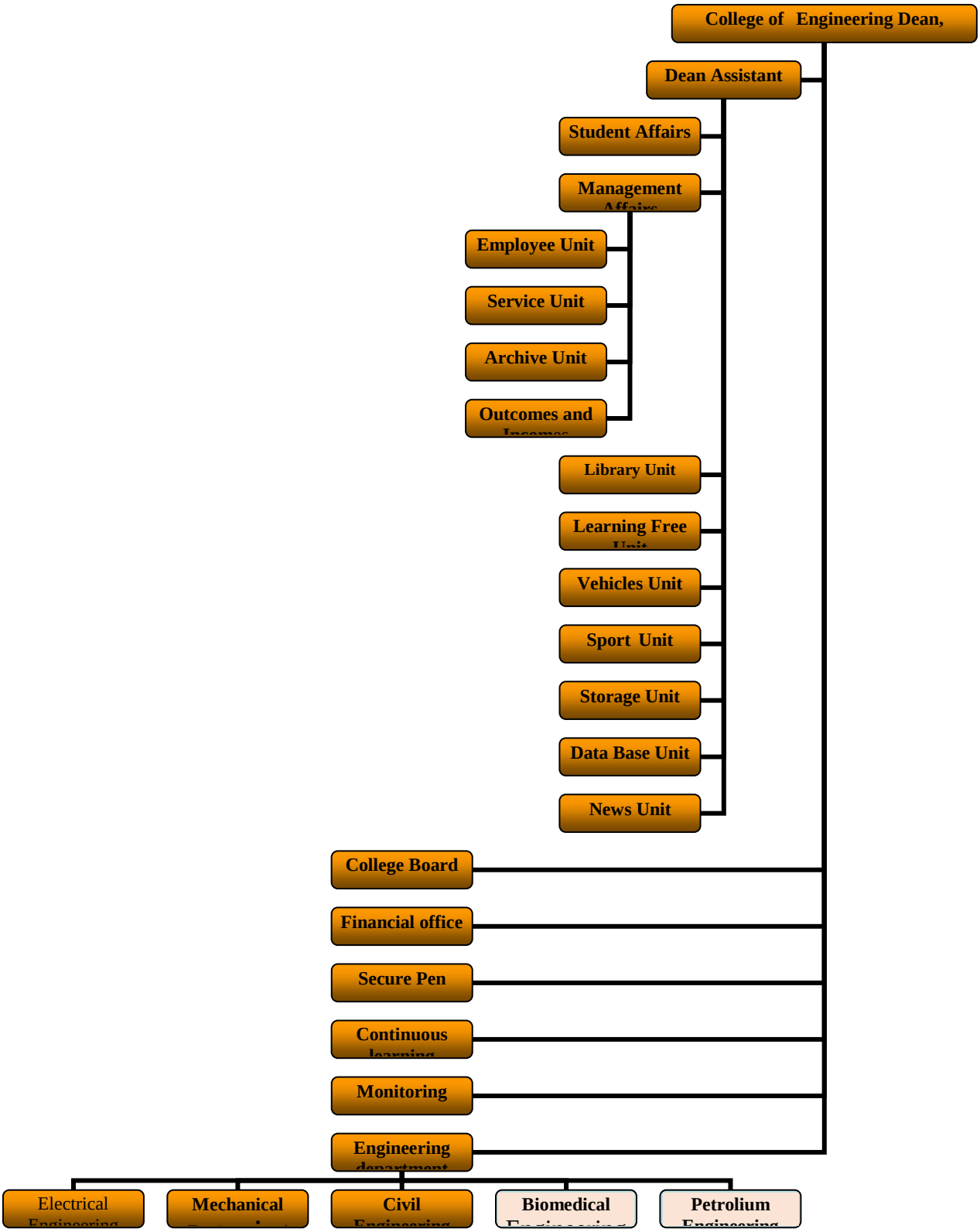


Figure 2 Partial organizational chart

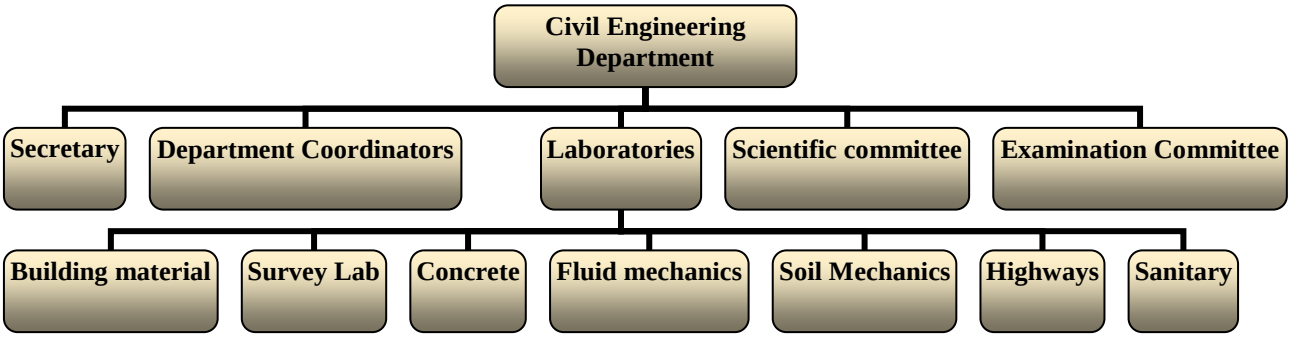


Figure 3 Partial organizational chart

F. Program delivery modes

The civil engineering program is a four years mode and an on campus- day program. Courses are generally offered on-campus during the day primarily between 8:30 am and 2:30 pm. Classes are taught as traditionally lecture/laboratory style. There are no courses offered in the evening. There is no formal co-operative program, no off-campus or distance courses (Web-based) (online options) offered during the academic year. There are two days off in the campus Friday and Saturday. The program begins at 3 September and ends at 30 Jun. One autumn holiday from 1 Feb. to 15 Feb and summer holiday from 1 July to 1 Sep. These dates may be changed yearly according to the regulation of ministry of higher education and scientific research. However, the times offered for the program still constant. The program also gives a chance for evening study.

G. Previous Evaluations and the Actions Taken (if applicable)

Three evaluations have been performed on this program. The first was in 2014 by the NISA group. The second was by the national program managed by the Ministry of higher education and scientific research. However, no specific evaluation report was presented for the program. The third evaluation was by checking the ability of the program to be accredited by ICAEE. Through this process, all the program criteria has been checked.

The program changes the criteria from ABET to ICAEE in 2019-2020. This year 2020-2021 is the second year that program works according to the ICAEE criteria and their graduate outcomes. Previously, ABET criteria are depended on.

CHAPTER ONE

CRITERION 1. PROGRAM EDUCATIONAL OBJECTIVES

This chapter shows the objectives of the educational program in light of the educational outcomes as well as the curriculum of the Department of Civil Engineering. This chapter also discusses the consistency of the objectives of the educational program with the mission and objectives of the university and the college.

1.1 Strategic Planning

Vision

Vision of the Department of Civil Engineering at the University of Thi-Qar, is to be the global leader in the preparation of professional and skilled engineers in various fields of civil engineering of construction, structures, geotechnical engineering, roads and bridges, dams and the environment.

Mission statement

The mission of program of Civil Engineering at the University of Thi-Qar is to prepare graduates to work in different professional jobs and lifelong learning by providing them with a solid foundation in mathematics, basic sciences, engineering sciences, which include structure, geotechnique, highways and traffic, surveying, hydrology, and the environment sciences. It also aims to provide graduates with the ability to analyze, design, identify and solve engineering problems, as well as the conduct and design of experiments, and to work in a multidisciplinary team, and communicate effectively with mastery of professional ethics and knowledge of contemporary issues.

1.2 Statement of program educational objectives (PEOs)

The program education objectives of the Civil Engineering program are to:

1. Provide graduates a strong foundation in mathematics, science, and engineering science in addition to the analysis and design in structure, geotechnique, highway, traffic, surveying, hydrology, and environment.

2. Provide graduates with the ability to identify and solve engineering problems as well as the ability to design and conduct laboratory experiments in building materials, concrete, fluid, soil, and asphalt.

3. Provide graduates with the skills oral and written communication and working within a multi-disciplinary team.

4. Prepare graduates to engage in lifelong learning, as well as the success in his career and professional development.

5. Prepare graduates to learn the ethics of the profession and knowledge of contemporary issues and influence in society.

The mission of civil engineering program is to prepare graduates for employment in various professional careers and for lifelong learning by providing them with solid base in math, science, engineering science related to structural, geotechnical, highways, hydrological, environmental engineering, and with ability to identify and solve engineering problems, analyze, design, design experiments, work in multi-disciplinary team, and communicate effectively.

University and college objectives

University Objectives

1. The University aims to disseminate scientific knowledge continues specialized scientific and intellectual with human evolution.

2. Development of scientific expertise and technical university in the service and community development plans.

3. Investigation and development of scientific cooperation with universities.

4. Preparation the graduates and give them certificates in the fields of scientific specializations.

5. Contain the graduates of the sons of the city of Nassiriyah.

College Mission

1. Efficient engineering staff establish and distinct (in various engineering disciplines) able to keep up with the needs of the labor market massive developments in modern technology.

2. Consulting engineering and economic feasibility studies and applied research.

College Objectives

1. Work to provide engineering staffs to meet the needs of the country in line with the progress in the process of reconstruction and economic development.

2. Work to provide the exact terms of reference in line with the evolution in the field of technology and industry.

3. Conducting studies, applied research, and engineering consultancy that would address the fundamental problems facing society, such as development and reconstruction.

4. Community development through the establishment of training courses, seminars for government, and private sector following modern scientific methods.

5. Supplement the country-teaching cadres through interest in the development of graduate studies in accordance with the quality standards and accreditation.

1.3 PEOs Consistency with the Mission Statement

Education objectives consistent with the mission of the college significantly as the overall goals are consistent with the mission of the university is good, too.

Achievement of the objectives of CEP by curriculum

The objectives of the civil engineering program are achieved by the curriculum that gives a strong foundation in math and science (Table 1.1). The math and science can be considered as training courses for engineering science such as fluid mechanics, strength of materials, Mechanics, soil mechanics, concrete. These give a good background to complete the studying of design and analysis of methods in structure and geotechnique, water resources, highways, and environment such as concrete design and foundation engineering and highway engineering.

Table 1.1 shows the relationships between curriculums the objectives.

Area	Course No.	Course Title	PEO1	PEO2	PEO3	PEO4
Engineering (Science)	CE124	Engineering drawing and descriptive engineering	√		√	√
	CE122	Engineering mechanics	√		√	√
	CE134	Engineering geology	√		√	√
	CE135	Building materials	√	√	√	√
	CE233	Fluid mechanics	√	√	√	√
	CE234	Engineering surveying	√	√	√	√
	CE235	Concrete technology	√	√	√	√
	CE236	Buildings construction	√		√	√
	CE231	Mechanics of materials	√		√	√
	CE333	Soil mechanics	√	√	√	√
Engineering (Methodology)					√	
	CE233	Fluid mechanics	√	√	√	√
	CE234	Engineering surveying	√	√	√	√
	CE235	Concrete technology	√	√	√	√
	CE236	Buildings construction	√		√	√
	CE331	Theory of structures	√		√	√

	CE332	Reinforced concrete	√		√	√
	CE324	Engineering and numerical analysis	√		√	√
	CE335	Engineering management and economy	√		√	√
	CE336	Traffic engineering	√		√	√
	CE337	Irrigation and drainage engineering	√		√	√
	CE338	Summer training	√		√	√
	CE431	Foundations engineering	√		√	√
Math and science	**CE121**	Mathematics I	√			
	CE222	Mathematics II	√			
	CE324	Engineering and numerical analysis	√			
	CE137	Engineering statistics	√			
	CE123	Principle of computer science	√	√		
	CE227	Computer programming	√			
General Education	CE118	Arabic language		√		√
	CE218	**Principles of democracy**		√		√

1.4 PEOs Review Process

To review the PEOs, a survey should be achieved for the following

a. Alumni Survey

b. Employers Survey

c. Exit Survey

e. Department Advisory Board Survey

1.5 Program Constituencies

The main constituencies of the Civil Engineering Program are:

1. Students

Students aged between 18-22 years who have graduated from high school science and grades exceeding 80 percent. The students who are still on four stages can be relied upon to modify the educational goals of the program.

2. Graduates

This group includes students who have graduated from the Faculty of Engineering and get a Bachelor's degree in engineering. These graduates must be moderate within the first five years after graduation, as it should moderate their work in civil engineering.

3. Staff

Employees in the private and public sector and who are considered an important factor in the review. College became now one of the most important institutions that provide services both in the city of Nasiriyah or in the rest of the other provinces in addition to a number of them complete their study outside and inside Iraq.

4. Faculty

Initial includes faculty members in the Department of Civil Engineering, as well as faculty members in the College of Engineering and finally faculty members at the university as a whole.

5. Department Advisory board

The content of the program.

The relationship between the goals of the program and educational standards ICAEE. All the goals that have been defined in the preceding paragraph is consistent with the standards nine ICAEE criteria as shown below.

2.1 Criterion 1: Program Educational Objectives

In order that the student gets the capacity and capability to employment as a civil engineer after graduating with the necessary outcomes from the educational program must be ensured through evaluation, oversight, and guidance during the period studied in the Department of Civil Engineering.

2.2 Criterion 2: Graduate Outcomes

2.3 Criterion 3: Curriculum

There is consistency between learning objective mentioned in the first point which includes providing the graduates with comprehensive knowledge in the basics of civil

engineering with the standard outcomes and comparing those outcomes with real outcomes.

2.4 Criterion 4: Continuous Improvement

This criterion regards the different curriculum that covers math, science, and various design methods in addition to communication skills and this is consistent with the first goal and the second goal of the educational program objectives.

2.5 Criterion 5: Students

The objectives of educational program are said to be graduates able to work in different sectors of the public and private sectors as well as in community service. The program aims to prepare the graduate to have the ability to learn the long-term and arming science, mathematics, and design methods task. It is made from the faculty members in Department of Civil Engineering.

2.6 Criterion 6: Faculty

The program educational objectives consistent with this criteria as the University of Thi Qar, Faculty of Engineering and Civil Engineering Department will provide all the necessary requirements to achieve those goals such as classrooms and furnished full and scientific laboratories required and library books and sources, computers and everything related to the achievement of those goals. Chapter 5 presents these facilities and discusses this topic in detail.

2.7 Criterion 7: Administrative Support

To ensure the goals of the educational program must provide financial support through which employment can provide various facilities. Thi-Qar University \ Faculty of Engineering has sufficient support to achieve those goals largely. Other chapters deal with the following criteria:

2.8 Criterion 8: Financial Support
2.9 Criterion 9: Facilities

There is a weakness in this process. It is not documented. It is planned to make it effective in the following years.

SWOT ANALYSIS

The following points should be taken in the action plan

1. Form an advisory board for the department
2. Develop a process to review the PEOs
3. Performing Alumni survey
4. Perform Faculty survey
5. Perform exit survey
6. Perform Department Advisory Board Survey

CHAPTER TWO

CRITERION 2. GRADUATE OUTCOMES

This section presents the outcomes of the program and their consistency with the required criteria. The discussion of how the outcomes related to the curriculum are also presented.

2.1 Program outcomes (POs) or Graduate outcomes (GOs)

The outcomes of the civil engineering program are as follow:

Graduates of the program must have:

1. An ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics.
2. An ability to produce engineering designs that meet desired needs within certain constraints by applying both analysis and synthesis in the design process.
3. An ability to create and carry out proper measurement and tests with quality assurance, analyze and interpret results, and utilize engineering judgment to make inferences.
4. An ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels.
5. An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological and societal considerations.
6. An ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble and apply it properly.
7. An ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainty.

The program of civil Engineering started in 2012 with ABET criteria (a to k criteria) which is then changed to the 7 outcomes developed updated by ABET and also the 1 to 7 outcomes depended by ICAEE. Below, are the outcomes according to a to k criteria

Outcomes according to ABET requirements (2000) are presented below

a. Ability to apply knowledge of math, engineering and science
b. Ability to design and construct experiment
c. Ability to design a system, component, or process
d. Ability to function on multi disciplinary teams
e. Ability to identify, formulates, and solve engineering problem.
f. Understanding of professional and ethical responsibility.
g. Ability to communicate effectively.
h. broad education to understand the impact of eng, solutions in a global and societal context
i. Recognition of the need for the ability to engage in lifelong learning
j. Knowledge of the contemporary issues.
k. Ability to use techniques, skills, and modern engineering tools necessary for engineering practice.

The objectives of the program was to:

1. Provide graduates a strong foundation in mathematics, science, and engineering science in addition to the analysis and design in structure, geotechnique, highway, traffic, surveying, hydrology, and environment.

2. Provide graduates with the ability to identify and solve engineering problems as well as the ability to design and conduct laboratory experiments in building materials, concrete and fluid, soil, and asphalt.

3. Provide graduates with the skills oral and written communication and working within a multi-disciplinary team.

4. Prepare graduates to engage in lifelong learning, as well as the success in his career and professional development.

5. Prepare graduates to learn the ethics of the profession and knowledge of contemporary issues and influence in society.

2.2 Relating GOs to PEO

Table 2.1 shows the relationship between the standard outcomes ABET and educational program in the Faculty of Engineering \ Department of Civil Engineering \ University of Thi Qar. Each outcome of engineering education in the standard ABET realized in educational outcomes at the University of Thi Qar.

Table 2.2 shows the relationship between the outcomes of the educational program of the Department of Civil Engineering, with the educational goals of the program. Also notes that the first educational goal is achieved through five outcomes of the educational program and the second goal is achieved through three outcomes of the educational program.

Table 2.1 Relationship between program educational objective and program outcomes.

Civil Engineering Outcome	Program Educational Objectives				
	1. Strong foundation in mathematics, engineering	2. Communication skills and work within a multidisciplinary team.	Provide graduates with the skills oral and written communication and working within a multi-disciplinary team.	3.Engage in lifelong learning	5. learn the ethics of the profession
1. Ability to apply knowledge in mathematics such as	√				
2. The ability to design and conduct experiments	√	√	√		
3. The ability to design systems	√				
4. The ability to work effectively with a multidisciplinary team		√			
5. The ability to identify, configure	√				

and solve engineering problems					
6.Understand professional and ethical responsibilities.					√
7. The ability to communicate effectively		√			
8. The desire and the ability to engage in lifelong learning.			√		√
9. Knowledge of contemporary issues.			√	√	
10. The ability to use the techniques, skills	√				

Table 2.٢ Matrix showing relationship between ABET a-k criteria 3 and CE UOT program .

		ABET a-k criteria 3											
		a	b	c	d	e	f	g	h	i	j	k	
UOT Civil Engineering Outcomes	1. Ability to apply knowledge in mathematics such as	√											
	2. The ability to design and conduct experiments		√										
	3. The ability to design systems			√									
	4. The ability to work effectively with a multidisciplinary team				√								
	5. The ability to identify, configure and solve engineering problems					√							
	6.Understand professional and ethical responsibilities.						√				√		
	7. The ability to communicate effectively							√					

	8. The desire and the ability to engage in lifelong learning.								√				
	9. Knowledge of contemporary issues.									√			
	10. The ability to use the techniques, skills											√	

Table 2.3 present the linkage between the Program Educational Objectives (PEOs) and the Graduate Outcomes (GOs) based on ICAEE. The achievement of the Graduate Outcomes (GOs) ensures that our graduates are well equipped to achieve the Program Educational Objectives in actual practice 3-5 years following graduation.

Table 2.3 Relationship between program educational objective and program outcomes according to ICAEE criteria.

Civil Engineering Outcomes	Program educational objectives (PEOs)				
	PEO1	PEO2	PEO3	PEO4	PEO5
GO1	√	√			
GO2	√				
GO3		√			
GO4			√	√	
GO5				√	√
GO6				√	
GO7			√		

SWOT Analysis

The following points should be taken in the quality plan

1. Mapping between a to k criteria of ABET and 1 to 7 criteria of ICAEE.
2. Effectively, make all the elements of the educational process objects to attain the GOs

CHAPTER THREE

CRITERION 3: CURRICULUM

3.1 Program Structure and Content

3.1.1 Study Plan

The Baccalaureate Degree of civil engineering program in college engineering at Thi-Qar University consists of **111** Units, which is equivalent to **120** hours. Table 3.1 a, b, c and d show the curriculum for the four years in addition to the units and hours for every material.

Table 3.1 Plan of study for Baccalaureate degree in Civil Engineering
First Year (Freshman year)

(First Year) Freshman Year

No.	Course No.	Course Title	Type	Weekly hours			Units
				Theoretical	*Tutorial*	*Practical*	
First Semester	**ER101**	Mathematics I	Math	3	1	–	**3**
	CE101	Engineering Mechanics I	Eng. Science	3	1	–	**3**
	CE103	Construction Materials I	Eng. Science	2	–	2	**3**
	ER103	Engineering Drawing	Eng. Science	3	–	3	**3**
	ER104	Computer Science	Eng. Science	1	1	2	**2**
	CE105	Engineering Geology I	Eng. Science	1	–	1	**2**
	CE107	Thermodynamics	Eng. Science	2	–	–	**2**
	ER106	Applied Physics	Eng. Science	2	–	–	**2**
	UR101	Arabic Language Skills	Humanity	2	–	–	**2**
	Sum			**19**	**3**	**8**	**22**
				30			
Second Semester	**ER102**	Mathematics II	Math	3	1	–	**3**
	CE102	Engineering Mechanics II	Eng. Science	3	1	–	**3**
	CE104	Construction Materials II	Eng. Science	2	–	2	**3**
	CE106	Engineering and Structural Drawing	Eng. Science	1	–	3	**2**
	CE108	Engineering Geology II	Eng. Science	1	–	1	**2**
	ER105	Computer Programming	Eng. Science	1	1	2	**2**
	CE109	Engineering Statistics and Probability Theory	Eng. Science	2	1	–	**2**
	ER107	Applied Chemistry	Eng. Science	2	–	–	**2**
	CE110	Engineering Workshops	Eng. Science	1	–	1	**2**

	ER108	Technical English Language	Humanity	1	–	–	**1**
	Sum			**17**	**4**	**9**	**22**
				30			

Second Year (sophomore year)

(Second Year) Sophomore Year

No.	**Course No.**	**Course Title**	**Type**	**Weekly hours**			**Units**
				Theoretical	***Tutorial***	***Practical***	
First Semester	**CE201**	Strength of Materials I	Eng. Science	3	1	–	**3**
	CE203	Mathematics III	Math	3	1	–	**3**
	CE205	Engineering Surveying I	Eng. Science	2	1	2	**3**
	CE207	Concrete Technology I	Eng. Science	2	1	2	**3**
	CE209	Buildings Construction I	Eng. Science	2	–	1	**2**
	CE211	Fluid Mechanics I	Eng. Science	2	1	2	**3**
	ER201	Fortran Programming	Comp. Science	1	–	2	**2**
	UR201	Principles of Democracy	Social Science	1	–	–	**1**
	Sum			**16**	**5**	**9**	**20**
				30			
Second Semester	**CE202**	Strength of Materials II	Eng. Science	3	1	–	**3**
	CE204	Mathematics IV	Math	3	1	–	**3**
	CE206	Engineering Surveying II	Eng. Science	2	1	2	**3**
	CE208	Concrete Technology II	Eng. Science	2	–	2	**3**
	CE210	Buildings Construction II	Eng. Science	2	–	1	**2**
	CE212	Fluid Mechanics II	Eng. Science	2	–	2	**3**
	CE214	Structural Drawing by Computer	Eng. Science	–	–	2	**1**
	ER202	Visual Basic Programming	Comp. Science	1		2	**2**
	UR202	Human Rights Principles	Social Science	1	–	–	**1**
	Sum			**16**	**3**	**11**	**21**
				30			

Third year (Junior year)

(Third Year) Junior Year

No.	Course No.	Course Title	Type	Weekly hours			Units
				Theoretical	*Tutorial*	*Practical*	
First Semester	**CE301**	Theory of Structures I	Eng. Science	3	1	–	**4**
	CE303	Reinforced Concrete Design I	Eng. Science	3	1	–	**4**
	CE305	Soil Mechanics I	Eng. Science	2	1	2	**4**
	CE307	Engineering Analysis	Math	3	1	–	**4**
	CE309	Construction Projects Management	Eng. Science	2	1	–	**3**
	CE311	Traffic Engineering	Eng. Science	2	1	–	**3**
	CE313	Irrigation and Drainage	Eng. Science	3	1	–	**4**
	ER301	Engineering Profession Ethics	Humanity	1	–	–	**1**
	Sum			**19**	**7**	**2**	**27**
				28			
Second Semester	**CE302**	Theory of Structures II	Eng. Science	3	1	–	**4**
	CE304	Reinforced Concrete Design II	Eng. Science	3	1	–	**4**
	CE306	Soil Mechanics II	Eng. Science	2	1	2	**4**
	CE308	Numerical Analysis	Math	3	1	–	**4**
	CE310	Engineering Economy	Eng. Science	2	–	–	**2**
	CE312	Highway Geometric Design	Eng. Science	2	1	–	**3**
	CE314	Engineering Hydrology	Eng. Science	2	1	–	**3**
	CE315	Structural Analysis and Design by Computer	Eng. Science	1		2	**2**
	ER302	Sumner Training	**Satisfaction**				
	Sum			**18**	**6**	**4**	**26**
				28			

Fourth Year (Senior year)

(Fourth Year) Senior Year

No.	Course No.	Course Title	Type	Weekly hours			Units
				Theoretical	*Tutorial*	*Practical*	
First Semester	**CE401**	Reinforced Concrete Structures Design	Eng. Science	2	1	–	**3**
	CE403	Foundation Engineering I	Eng. Science	3	1	–	**4**
	CE405	Highway Materials	Eng. Science	2	1	2	**4**
	CE407	Water Supply Engineering	Eng. Science	2	1	2	**4**
	CE409	Equipments and Construction Method	Eng. Science	2	1	–	**3**
	CE411	Hydraulic Structures	Eng. Science	2	1	–	**3**
	CE413	Steel Structures Design I	Eng. Science	2	1	–	**3**
	CE415	GIS Applications	Eng. Science	–	–	1	**1**
	ER401	Engineering Graduation Project (Cont…).	Eng. Science	1	–	2	**2**
	Sum			**16**	**7**	**7**	**27**
				30			
Second Semester	**CE402**	Prestress Concrete Design	Eng. Science	2	1	–	**3**
	CE404	Foundation Engineering II	Eng. Science	3	1	–	**4**
	CE406	Pavements Analysis and Design	Eng. Science	3	1	--	**4**
	CE408	Environmental and Sewerage Engineering	Eng. Science	2	1	2	**4**
	CE410	Quantity Estimation and Specifications	Eng. Science	2	1	–	**3**
	CE412	Dams Engineering	Eng. Science	2	1	–	**3**
	CE414	Steel Structures Design II	Eng. Science	2	1	–	**3**
	CE416	Bridges Engineering	Eng. Science	1	1	–	**2**
	ER401	Engineering Graduation Project	Eng. Science	1	–	2	**2**
	Sum			**18**	**8**	**4**	**28**
				30			

3.1.2 Alignment with PEOs

The Program education objectives are to:

1. Provide graduates a strong foundation in mathematics, science, and engineering science in addition to the analysis and design in structure, geotechnique, highway, traffic, surveying, hydrology, and environment.

2. Provide graduates with the ability to identify and solve engineering problems as well as the ability to design and conduct laboratory experiments in building materials, concrete and fluid, soil, and asphalt.

3. Provide graduates with the skills oral and written communication and working within a multi-disciplinary team.

4. Prepare graduates to engage in lifelong learning, as well as the success in his career and professional development.

5. Prepare graduates to learn the ethics of the profession and knowledge of contemporary issues and influence in society.

Outcomes according to ICAEE requirements 2018 are presented below

1. An ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics.
2. An ability to produce engineering designs that meet desired needs within certain constraints by applying both analysis and synthesis in the design process.
3. An ability to create and carry out proper measurement and tests with quality assurance, analyze and interpret results, and utilize engineering judgment to make inferences.
4. An ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels.

5. An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological and societal considerations.
6. An ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble and apply it properly.
7. An ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainty.

3.1.3 Attainment of GOs

Table 3.2: Program outcome curriculum map with ICAEE outcomes

	GOs (ICAEE)	1	2	3	4	5	6	7
	GOs (ABET)							
ER101	Mathematics I							
CE101	Engineering Mechanics I							
CE103	Construction Materials I							
ER103	Engineering Drawing							
ER104	Computer Science							
CE105	Engineering Geology I							
CE107	Thermodynamics							
ER106	Applied Physics							
UR101	Arabic Language Skills							
ER102	Mathematics II							
CE102	Engineering Mechanics II							
CE104	Construction Materials II							
CE106	Engineering and Structural Drawing							
CE108	Engineering Geology II							
ER105	Computer Programming							
CE109	Engineering Statistics and Probability Theory							
ER107	Applied Chemistry							
CE110	Engineering Workshops							
ER108	Technical English Language							
CE201	Strength of Materials I							
CE203	Mathematics III							
CE205	Engineering Surveying I							
CE207	Concrete Technology I							
CE209	Buildings Construction I							

CE211	Fluid Mechanics I							
ER201	Fortran Programming							
UR201	Principles of Democracy							
CE202	Strength of Materials II							
CE204	Mathematics IV							
CE206	Engineering Surveying II							
CE208	Concrete Technology II							
CE210	Buildings Construction II							
CE212	Fluid Mechanics II							
CE214	Structural Drawing by Computer							
ER202	Visual Basic Programming							
UR202	Human Rights Principles							
CE301	Theory of Structures I							
CE303	Reinforced Concrete Design I							
CE305	Soil Mechanics I							
CE307	Engineering Analysis							
CE309	Construction Projects Management							
CE311	Traffic Engineering							
CE313	Irrigation and Drainage							
ER301	Engineering Profession Ethics							
CE302	Theory of Structures II							
CE304	Reinforced Concrete Design II							
CE306	Soil Mechanics II							
CE308	Numerical Analysis							
CE310	Engineering Economy							
CE312	Highway Geometric Design							
CE314	Engineering Hydrology							
CE315	Structural Analysis and Design by Computer							
ER302	Sumner Training							
CE401	Reinforced Concrete Structures Design							
CE403	Foundation Engineering I							
CE405	Highway Materials							
CE407	Water Supply Engineering							
CE409	Equipments and Construction Method							
CE411	Hydraulic Structures							
CE413	Steel Structures Design I							
CE415	GIS Applications							
ER401	Engineering Graduation Project (Cont…).							
CE402	Prestress Concrete Design							

CE404	Foundation Engineering II							
CE406	Pavements Analysis and Design							
CE408	Environmental and Sewerage Engineering							
CE410	Quantity Estimation and Specifications							
CE412	Dams Engineering							
CE414	Steel Structures Design II							
CE416	Bridges Engineering							
ER401	Engineering Graduation Project							

3.1.4 Prerequisite Structure

The curriculum of every academic year is prepared so that the second academic year depends on it. All course are checked by the scientific committee and approved by the Deans committee.

3.1.5 Subject Areas Requirements

The civil engineering program prepare the graduates to enter the practice with a strong base in mathematical and basic science, engineering topics in structural , soil, roads, water resources and general educations such as languages and humanities in addition to ethics as presented in Table 3.1, 3.2 and Fig. 3.1

Mathematics and basic sciences

The civil engineering program curriculum at baccalaureate level provides the following units/credit hours for math and basic science (Table 3.3). The ICAEE requirement of math and basic science within the curriculum shall equivalent to minimum of 30 credit 25% of total credits. The total unit of the civil engineering is 152 and the hours are 111 hours. This requires 28 hours for math and science which equivalent to 38 units. However, the graduate of the department complete only 22 hours in math science, which is equivalent to 18% of total units and 20 % of hours.

Table 3.3 Math and science courses

Math and science			
Course No.	**Course Title**	**Credits**	Weekly hours
ER101	Mathematics I	3	4
ER102	Mathematics II	3	4
CE203	Mathematics III	3	٤
CE204	Mathematics IV	3	4
CE307	Engineering Analysis	4	٤
CE308	Numerical Analysis	4	4
CE109	Engineering Statistics and Probability Theory	2	3
ER105	Computer Programming	2	3
ER104	Computer Science	2	3
ER202	Visual Basic Programming	2	3
ER201	Fortran Programming	2	3
ER106	Applied Physics	2	2
ER107	Applied Chemistry	2	2
Total		34	43

General education

In the department of civil engineering the general education is limited to two materials the Arabic language for the freshman year and the principles of democracy. The units are 4 units which equivalent to 4/152 to less than 1% of the total units. There is a lake in the communication skills such as writing, oral communication and critical thinking. Table 3.4 shows the general education courses. Arabic language located under the humanities and principle of democracy is located under the social science.

Table 3.4 General education courses

General Education			
Course No.	Course Title	Units	Weekly hours
CE118	Arabic language	2	2
CE218	Principles of democracy	4	2

Engineering

Technical requirements are 1.5-year 48 credits of engineering topics that includes engineering science and design. The percentage of engineering science is equal to 118/152 and engineering design reach to 75% (83 hours and 118 units). Table 3.5 and 3.6 show the engineering and science courses.

Table 3.5 Engineering and science courses

Engineering / Science			
Course No.	**Course Title**	**Units**	Weekly hours
CE124	**Engineering drawing and descriptive engineering**		
CE122	**Engineering mechanics**	**6**	4
CE134	**Engineering geology**	**6**	3
CE135	**Building materials**	**5**	٢
CE233	**Fluid mechanics**	٥	٤
CE234	**Engineering surveying**	٦	٥
CE235	**Concrete technology**	٦	٤
CE236	**Buildings construction**	٣	٣
CE231	**Mechanics of materials**	٦	٤
CE333	**Soil mechanics**	٦	٥
		49	34

Table 3.6 Engineering methodology courses.

Engineering / Methodology			
Course No.	**Course Title**	**Units**	Weekly hours
CE234	**Engineering surveying**	٦	٥
CE331	**Theory of structure**	٦	٤
CE332	**Reinforced concrete**	٦	٤
CE335	**Engineering management and economical**	٤	٢
CE336	**Traffic engineering**	٤	٢
CE337	**Irrigation and drainage engineering**	٤	٣
CE431	**Foundation engineering**	٦	٤
CE432	**Reinforced concrete design**	٤	3
CE433	**Steel design**	٢	٢
CE434	**Hydraulic structures**	٤	٣
CE435	**Sanitary engineering**	٦	٦

CE436	**Engineering Hydrology**	٤	٣
CE437	**Quantity surveying and construction methods**	٤	٢
CE438	**Roads engineering**	٥	٣
CE439	**Engineering project**	٤	٣
		69	49

3.1.6 Major Design Experience

The final design course can be taken in the senior capstone design. The student know how to apply fundamental math and basic science, the design principles to formulate the problem of project. In addition to that, the students learn how to design of the experiments to solve the problems through performing the project. A discussion by a committee for every project at the end of the project are achieved. The lifelong learning can be gained through preparing the project.

The student are distributed in a group of 2 to 4 students to encourage them to work in team. At least five criteria are evaluated: the technical contents, presentations, and response to questions in addition to the work in team skills and assessment of the graduated outcomes related to the project. The distribution of student to the supervisors follow assessment according to their likeness to the project and supervisor based on their average marks through their study in four years.

3.1.7 Teaching and Learning Strategies

The teaching materials consists of the course syllabus, objectives, learning outcomes, strategies of learning which may different from course to other course, assignment are submitted to the department. All the student work samples such as exam, projects and quizzes. The method of learning such as problem based learning are encouraged to be used in learning process.

Table 3.6 a, b, c and d show the details of course with respect to the theoretical courses and practical courses. The type of each course is also presented in the table. Figure 3.2 shows the distribution of unit on the theoretical, tutorial credits as well as the total credits for theoretical and practical courses.

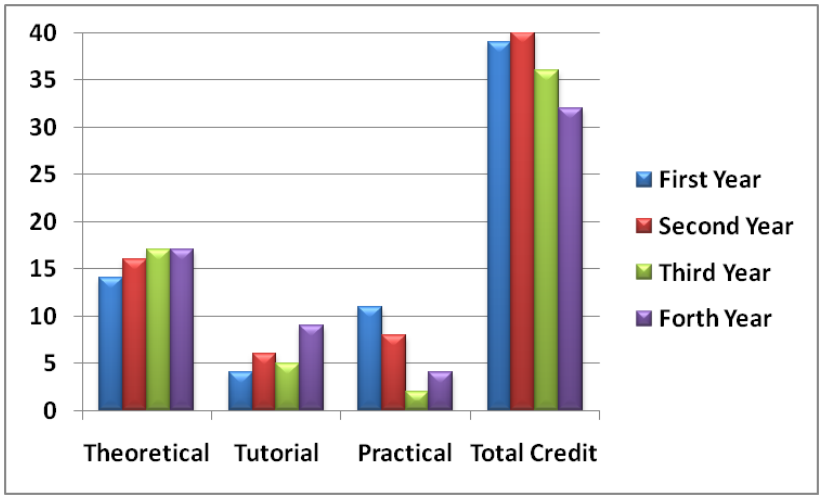


Figure 3.2 Distribution of credit on theoretical tutorial and practical.

Department, college, and university requirement

Tables 3.7 a, b and c show the university, college and department requirements. The total units of the university requirements are 12 units, college courses credits are 41credits, and the department courses are 101 units. Figure 5.2 shows pie chart demonstrates the percentage of university, college and department courses percentage.

Table 3.7 a University requirements

Course No.	Course Title	Credit	Weekly hours
CE118	Arabic language	4	2
CE218	Principles of democracy	4	2
CE439	Engineering project	4	3
		12	**7**

Table 3.8 b College requirements

Course No.	Course Title	Credit	Weekly hours
CE121	Mathematics I	6	**4**
CE222	Mathematics II	6	**4**
CE123	Principles of computer science	4	**4**
CE227	Computer programming	4	**4**
CE122	Engineering mechanics	6	**4**
CE124	Engineering drawing and descriptive engineering	6	**6**
CE116	Engineering workshop	3	**2**
CE324	Engineering and numerical analysis	**6**	**4**

Table 3.8 c Department requirements.

Course No.	Course Title	Credit	Weekly hours
CE137	Engineering statistics	2	2
CE135	Building materials	5	3
CE134	Engineering geology	3	2
CE231	Strength of materials	6	4
CE233	Fluid mechanics	5	4
CE235	Concrete technology	6	4
CE234	Engineering surveying	6	5
CE236	Buildings construction	3	3
CE331	Theory of structures	6	4
CE333	Soil mechanics	6	5
CE332	Reinforced concrete	6	4
CE337	Irrigation and drainage engineering	4	3
CE335	Engineering management and economy	4	2
CE336	Traffic engineering	4	2
CE431	Foundations engineering	٦	٤
CE432	Reinforced concrete design	٤	3
CE433	Steel design	٢	٢
CE434	Hydraulic structures	٤	٣
CE435	Sanitary engineering	٦	٦
CE436	Hydrology	٤	٣

CE437	Quantity surveying and construction methods	٤	٢
CE438	Roads engineering	٥	٣
		101	74

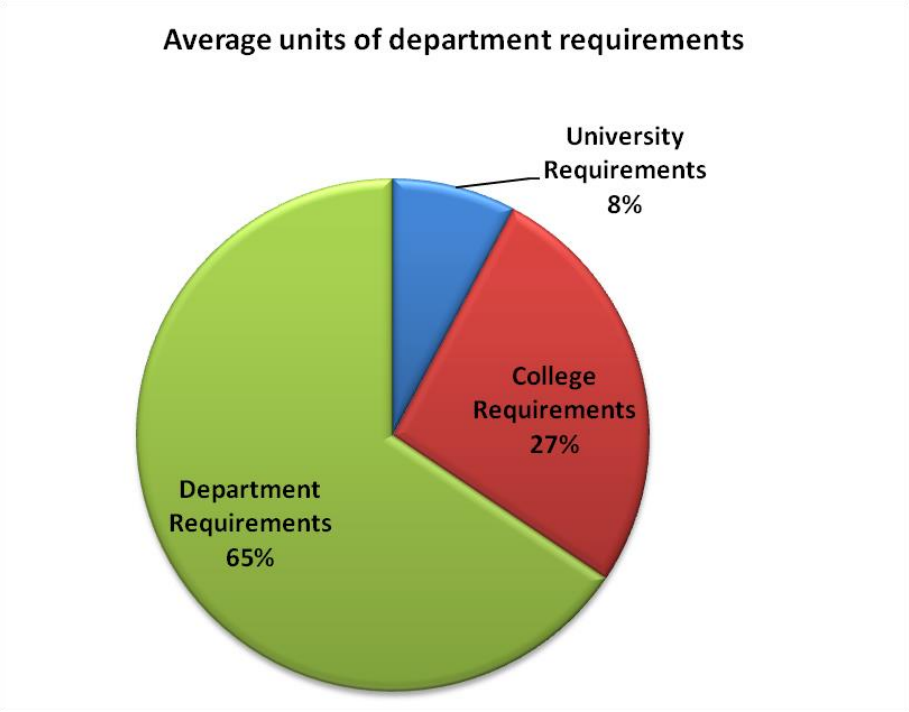


Figure 3.3 Chart of university, college, and department requirement courses.

In appendix A, the syllabus of every course of math, science and engineering are provided.

3.2 Relating Courses Learning Outcomes to GOs

Table 3.3 shows the mapping between courses and the graduate outcomes. The faculty member have to submit a form of the scientific plan of the course which consists of the course learning outcomes and the mapping with graduate outcomes. The scientific plan for the course is approved by the scientific committee.

SWOT analysis

The following points should be taken in the quality plan

1. All the faculty member shall submit the alignment of the course learning outcomes with the GOs at the beginning of the course
2. The learning method that help in attaining the GOs shall determined

CHAPTER FOUR

CRITERION FOUR: CONTINUOUS IMPROVEMENT

4.1 Achievement of Graduate outcomes

The program shall use a documented process for assessing and evaluating the attaining of the student to the graduate outcomes developed by ICAEE or ABET. Then the evaluations shall be used as input to the process of continuous improvement of the program. The assessing shall uses direct and indirect measures for the constituencies of the program. The systematic process is not effectively utilized through this cycle and development are needed to achieve this criteria.

Assessment Process

The assessment procedures used in this program are direct and indirect assessment. Direct assessment which includes the course assessment in the midterm and final examination in addition to graduation projects. Indirect assessment which includes Alumni survey, employer survey, summer training survey. This process is not effectively achieved. It is marked as weakness in the criteria

To ensure the attainment of the program of Bachelor of civil engineering to the graduate outcomes, two system of assessment are employed: the first is the assessment at the level of course and the second is the assessment at the level of program. Both systems needs evaluations as a second process of the ensuring the attainment of GOs. A weakness is marked in this part since the evaluation at the level of program is not documented and the graduate outcomes have not been taken into evaluation.

Assessment of achievement of CLOs

Achievement of the CLOs from the instructor point of view

Achievement of the CLOs from the student point of view

Degree of coverage of course contents from instructor point of view

Achievement of learning outcomes based on Students' grades on assessment items

Proposals for improvements based on assessment results

Students' evaluation of courses and instructors

Assessment at a program level GOs

It contains the following tools

Coverage of program learning outcomes based on CLOs

Achievement of the GOs based on the results assessment of CLOs

Alumni survey

Employer survey

Exit survey of graduated students

Feedback from visiting accreditation teams

4.2 Actions for Continuous Improvement

The program of civil engineering depended on the criteria developed by ICAEE in 2019. Since it is the first year and the assessment need one year and the evaluation may be fulfilled in more than another one year, the ABET criteria is needed for years before 2018.

SWOT

The following points should be taken into consideration in quality plan

1. Utilize various assessment such as direct and indirect
2. Assessment before the examination from the view of faculty members
3. Assessment before examination from the viewpoint of the students.
4. Evaluation all the surveys and the assessments.
5. Take an action to improvement the weakness in attaining the outcomes

CHAPTER FIVE

CRITERION 5: STUDENTS

In this section, students are discussed from the perspectives of admission, performance evaluation, progress monitoring, transfer, and compliance with degree requirements. This section also contains the examination mode.

5.1 Student Admissions

The admission in our college is central. The student submitted their documents of which college and university they want to the ministry of higher education and scientific research, then the ministry distributes the student among the universities. Our college has a planning for number of students they can receipt. The student must complete 6 years of primary school and 6 years for secondary school. The student must be in scientific branch so that he can apply to the engineering college. The admission for student is divided into two categories admission for freshman student and admission for former students.

The criteria to be admitted to the college of engineering are listed below:

1. Certification of school graduated document.
2. A completed admission application.
3. High school transcript.
4. Certified from the low office of university.
5. Hospital checking document.
6. High school transcripts or GED scores.
7. Nationality document and certified nationality.
8. Living document.

5.2 Student Performance and Progress

Evaluation of student performance is function of faculty. The faculty member evaluates and monitors student progress for each class taken. Students in the program are evaluated with respect to their preparation for entry into the general practice of civil engineering and their preparation for graduate education. The evaluation is conducted primarily through performance as described below:

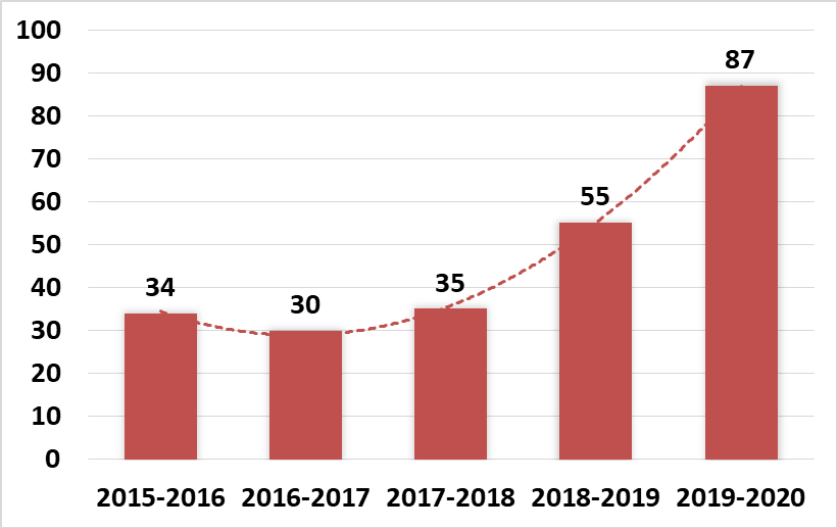


Figure 5.1 Admissible student in the CV program during five years

Course performance

- Exams (tests, quizzes, midterm, second term, and final exams)
- Problem sets and homework
- Laboratory assignments
- Project reports (oral and written)

Instructors' reviews and comments on homework assignments and tests provide the student with feedback on their performance. Knowledge, skills, and ability to perform in the laboratory are evaluated through review of laboratory reports. Ability to work effectively in teams and to communicate correctly and effectively is evaluated through performance in laboratory work and design teams. The University uses Fail for degrees less than 50, Accepted for degrees between 50 and 59, Middle for degrees

between 60 and 69, good for degrees between 70 and 79, very good for degrees between 80 and 89, excellent for degrees between 90 and 99 (Table 5.1).

The evaluation is conducted primarily through the performance as described below.

Courses that the students take are evaluated through the above process in the freshman level, sophomore, junior and senior level. Some of requirements are evaluated differently such as the summer training which is taken for junior level.

Table 5.1 Grade of Assessment

Degree	<50	50-59	60-69	70-79	8-89	90-99
Grade	Weak	Accepted	Moderate	Good	Very good	Excellent

For the theoretical courses, the evaluation passes through the first semester examination, which equal to 20% of the degree. The second semester exam is 15% and 5% is for quizzes and homework. The annual average degree is 40%. The final examination is 60%. For the courses that have laboratory, the final exam is 50%.where 10% for final examination for lab. Figure 5.1 and 5.2 shows the marks distribution.

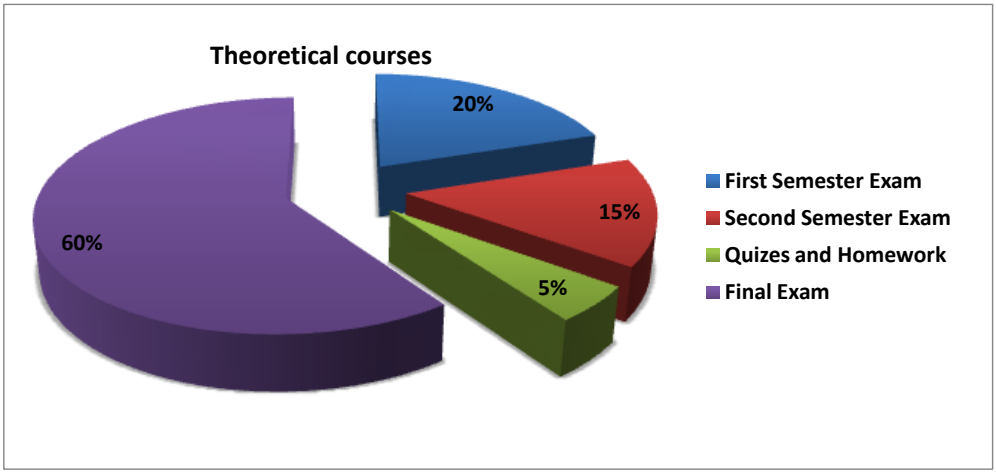


Figure 5.٢ Evaluation of theoretical courses.

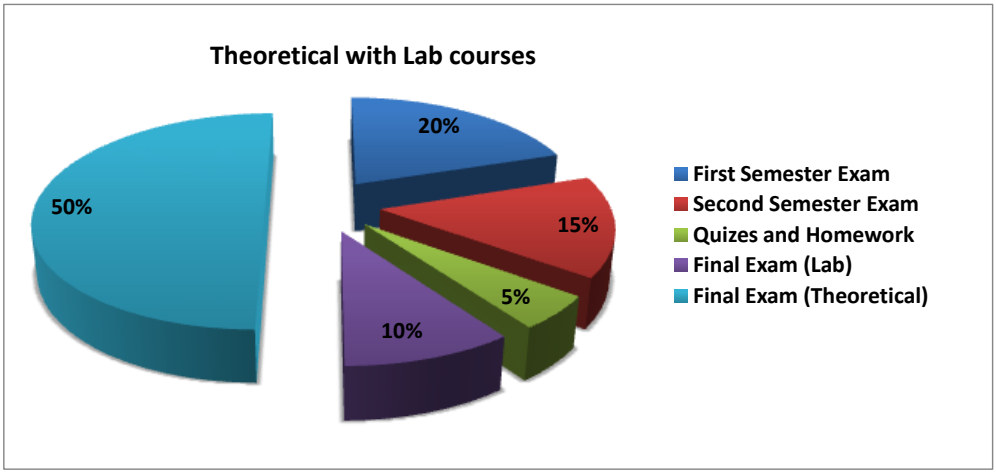


Figure 5.3 Practical courses evaluation.

5.3 Transfer Student and Transfer Courses

Students from outside the civil engineering department in college of engineering who wish to transfer into the Civil Engineering program of engineering college of Thi-qar University must make a formal application through the University Admissions office. The transfer has not been completed without reviewing the courses and credits. The regulation that our university follows is the regulation of ministry of higher education and scientific research. The student must ask the first university to send the syllabus in details with the credit to our university in order to check if there is an ability for transferring. A document from the head of department is sent to the scientific committee in the civil engineering. After accepting that, the student has to ask his original university to send the transcript sheet. A final decision is made. Once the student has been admitted, the formal transfer of courses from the other institution to Thi-Qar University, Civil Engineering degree program is completed. The scientific committee of the civil engineering department determines course equivalencies. Our college accepts a maximum of 30 credits toward a baccalaureate degree from other colleges and universities. Articulation agreements have been established with the following institutions:

Baghdad University , Basrah University , Almuthana University , Kerbalaa University

5.4 Monitoring, Students Advising and Extracurricular Activities

Monitoring of student progress is the responsibility of the head of civil engineering department. He has ready access to students' transcripts and Academic Progress Reports, notes from past meetings, and any other pertinent material, in the student files maintained in the department office. Attention is focused on those students having some form of academic difficulty, since that is a strong indication that proper preparation for civil engineering practice is not occurring. Monitoring occurs in the following ways:

Head of civil department review the academic performance on a periodic basis (three times) one after the midterm examination, and second after the second term examination.

5.5 Graduation Requirements

These requirements apply to students entering this program 2012 and thereafter. Student at civil engineering department graduates with Bachelor of Science in civil engineering. The specific requirements for graduation from the civil engineering department are:

1. Weekly hours for both theoretical and practical study shall be between 26-32 hrs.
2. Number of materials shall be between six and eight.
3. Percentage of theoretical to practical material shall be between 40% and 60%.
4. Number of education hours for graduation shall be between 3000 and 3600.
5. Number of credits for graduation shall be between 140 to 160.
6. General courses shall be between 5 to 15%, basic science shall be between 15% to 25%, engineering material shall be between 60 and 80%.
7. Units are calculated as one theoretical hour equal one unit, 2-3 practical equal one unit. Other hours are decided by university broad (Project and continuous performance)
8. Maintain cumulative average of at least 50 overall. The official grading system runs from Acceptance medium, good, very good, and excellent.

9. Complete at least 120 or 90 credit in the civil engineering department.

a. The process used to certify that graduation requirements have been met by each graduate begins with registration for the student's final semester classes.

CHAPTER SIX

CRITERION 6: FACULTY

This section demonstrates the adequacy of faculty members of our department to cover all the curricular and the sufficiency of number and quality of them.

6.1 Faculty Qualification

The department has 35 faculty members as a total number. Thirty four faculty members are active where four of them enjoy completing their PhD study. Our faculty is various discipline distributed through different specialists. The faculty staff is stable. No faculty member is retired since the faculty members are all under fifteen years old. Figure 6.1 shows the faculty member distributions. All the majors are also depicted in the Figure. Appendix A shows the faculty member curriculum vetae.

The faculty majors distributed into the following specialists:

1. Structural Engineering
2. Geotechnical engineering
3. Highways and Road Engineering
4. Survey Engineering
5. Management Engineering
6. Water Resource Engineering
7. Environmental Engineering

Table 6.1 shows the qualification of the staff. They have an experience in teaching in addition to the consultant experience. They have an academic experience in the same college in addition to other college and universities.

Table 6.1 Qualification of the faculty members

Faculty Member Name	Higher Degree Earned, Field and Year	Scientific Rank	Type of Academic Appointment PS, or	FT or PT	Year of experience			Professional Registration/Certification	Level Of Activity H, M, Or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/Work In Industry
Ressol R. Shakir	Ph.D / Geo/2009	P	PS	FT	0	20	19	Professor	M	H	H
Muhammed A. Mushre	Ph.D/Str	P	PS	FT					M	H	H
Nissreen K. Thabah	Ph.D / Geo/	P	PS	FT					M	H	H
Hussein A. Shaia	Ph.D / Geo/	ASP	PS	FT					M	H	H
Haider H. Audah	Ph.D/R	ASP	PS	FT					M	H	H
Laith H. Manshad	Ph.D/Arch	ASP	PS	FT					M	H	H
Jamal S. Maki	Ph.D/WR	ASP	PS	FT					M	H	H
Alaa H. AlRikabi	Ph.D / Geo/	ASP	PS	FT					M	H	H
Ali K. Alasadi	Ph.D/Str	ASP	PS	FT					M	H	H
Kassim A. Alridha	Ph.D/Manag	ASP	PS	FT					M	H	H
Muhammed H. Thijeel	Ph.D/	ASP	PS	FT					M	H	H
Riadh A. Yassir	Ph.D/Env	ASP	PS	FT					M	H	H
Majid D. Mutasher	Ph.D/Str	ASP	PS	FT					M	H	H

Jawad K. Thejeel	Ph.D/Geo	L	PS	FT					M	H	H
Ali A. Sultan	Ph.D/Str	ASP	PS	FT					M	H	H
Haider M. Alewi	Ph.D/BM	L	PS	FT					M	H	H
Yahya R. Adewi	Ph.D/BM	L	PS	FT					M	H	H
Ganim M. Kamil	Ph.D/Str	L	PS	FT					M	H	H
Basim M. Nusseif	Ph.D/WR	L	PS	FT					M	H	H
Hassan S. Jawad	Ph.D/BM	L	PS	FT					M	H	H
Alaa M. Hassan	PhD/Geo	L	PS	FT					M	H	H
Ali M. Nassir	PhD/Geo	L	PS	FT					M	H	H
Wassan K. Fayadh	Ph.D/Str	L	PS	FT					M	H	H
Ali A. Almuhsin	Ph.D/Str	L	PS	FT					M	H	H
Murtada S Sajit	Ph.D/GeoM	ASP	PS	PT					M	H	H
Abbas J. Esmaeel	Ph.D/H	ASL	PS	FT					M	H	H
Ameer H. Muhammed	M.Sc/Hiahways	L	PS	FT					M	H	H
Alaa M. Mahdi	M.Sc/Manag	L	PS	PT					M	H	H
Haider K. Sakban	M.Sc/Str	ASL	PS	FT					M	H	H
Firas A. Alridha	M.Sc/Str	ASL	PS	FT					M	H	H
Khaldoon K. Asswad	M.Sc/Str	ASL	PS	PT					M	H	H
Nasir H. Nassir	M.Sc/Env	ASL	PS	PT					M	H	H
Fatima H. Fleih		ASL	PS	FT					M	H	H
Shifaa N. Abd Alhassan	M.Sc/Str	ASL	PS	FT					M	H	H
Saja M. Khazal	M.Sc/Geomatic	ASL	PS	FT					M	H	H

1 Code: P = Professor, ASP = Assistant Professor, L = Lecturer, ASL = Assistant Lecturer and O = Other.
2 Code: PS = Permanent Staff, TS = Temporary Staff.
3 FT = Full Time Faculty or PT = Part Time Faculty, at the institution.
4 The level of activity, H = high, M= Medium or L=Low.

Figure 6.1 shows the percentage of every spetcialists that support the program. It is clear that the structure and geotechnical forms more than 50% of the staff. The second is the water resurce major which forms 12%. Others are distributed through the remain percent of majors.

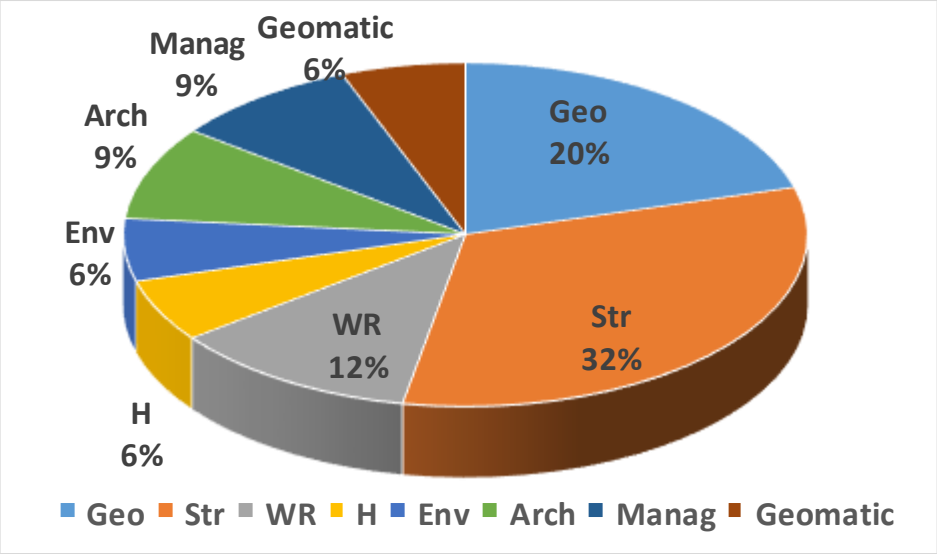


Figure 6.1 Pie chart of the distribution of specialist that support the Program

6.2 Faculty Workload

Table 6.2 summarizes the course load and other activities for each faculty member for the 2011-2012 academic year. The full-time faculty is achieved by a work load of 8 for Professor, 10 hrs. for Assistant Prof, 12 hrs. for Lecturer and 14 hrs. for Assistant Prof. It is clear that the staff works as full time. The contribution in the postgraduate courses are not mentioned in the Table. The administration duties reduced credits. These administration duties includes The Chairs of department, Dean and vice-Dean of college, examination committee.

Table 6.2 The workload of the faculty members

	Faculty Member Name	FT or PT	Classes Taught (Course No./Credit Hrs.) Term and Year	Program activity			% Of Time Devoted To The Program
				Teaching	Research	Other	
1	Ressol R. Shakir	FT	Foundation Engineering (2hrs /1,2); Project 1,2	40%	30%	20%	90%
2	Muhammed A. Mushre	FT	Concrete 4hrs, 1,2	40%	30%	20%	90%
3	Nissreen K. Thabah	FT	Numerical Analysis, 4 hrs, 1,2	40%	30%	20%	90%
4	Hussein A. Shaia	FT	Soil Lab, 2hrs,1,2 +Project	40%	30%	20%	90%
5	Haider H. Audah	FT	Highways with Lab 4 hrs, 1,2+Project				
6	Laith H. Manshad	FT	Arch, 4hrs, Concrete	40%	30%	20%	90%
7	Jamal S. Maki	FT	Hydraulic structure, 3hrs, 1, 2	40%	30%	20%	90%
8	Alaa H. AlRikabi	FT	Soil Mechanics, 3 hrs, 1,2, Lab+Proj	40%	30%	20%	90%
9	Ali K. Alasadi	FT	Strength of material, 4 hrs,1,2	40%	30%	20%	90%
10	Kassim A. Alridha	FT	Manag., 3 hrs,1,2;Proj	40%	30%	20%	90%
11	Muhammed H. Thijeel	FT	Geomatic,1,2 hrs; Gis Lab 1,2	40%	30%	20%	90%
12	Riadh A. Yassir	FT	Sanitary Eng., 3hrs,1,2; Lab;Proj	40%	30%	20%	90%
13	Majid D. Mutasher	FT	Concrete, Lab,1,2	40%	30%	20%	90%
14	Jawad K. Thejeel	FT	Computer, 2hrs,1,2; Lab 4 hrs,1,2	40%	30%	20%	90%
15	Ali A. Sultan	FT	Structure, 4hrs,1,2	40%	30%	20%	90%
16	Haider M. Alewi	FT	Concrete Tech, 4hrs,1,2; Lab 4hrs,1,2	40%	30%	20%	90%
17	Yahya R. Adewi	FT	Building Material 2hrs,1,2;Lab, 4hrs,1,2;Project	40%	30%	20%	90%
18	Ganim M. Kamil	FT	Concrete design, 3hrs,1,2;Lab 2hrs,1,2;Proj.	40%	30%	20%	90%
19	Basim M. Nusseif	FT	Fluid mechanics, 4hrs,1,2;Lab 4 hrs,1,2	40%	30%	20%	90%
20	Hassan S. Jawad	FT	Building Mat. 2hrs,1,2; Lab 4hrs; Proj	40%	30%	20%	90%

21	Alaa M. Hassan	FT	Mathematics 8hrs,1,2;Lab;Project	40%	30%	20%	90%
22	Ali M. Nassir	FT	Soil Lab, 4hrs1,2; Proj	40%	30%	20%	90%
23	Wassan K. Fayadh	FT	Math,4 hrs, 1,2; Steel Design, 2hrs 1,2	40%	30%	20%	90%
24	Ali A. Almuhsin	FT	Building str. 3hrs,1,2;Proj	40%	30%	20%	90%
25	Murtada S Sajit	FT	Doctoral Cand.	40%	30%	20%	90%
26	Abbas J. Esmaeel	FT	Doctoral Cand.	40%	30%	20%	90%
27	Ameer H. Muhammed	FT	Trafic, 4hrs,1,2;Proj	40%	30%	20%	90%
28	Alaa M. Mahdi	FT	Doctoral Cand.	40%	30%	20%	90%
29	Haider K. Sakban	FT	Doctoral Cand.	40%	30%	20%	90%
30	Firas A. Alridha	FT	Doctoral Cand.	40%	30%	20%	90%
31	Khaldoon K. Asswad	FT	Doctoral Cand.	40%	30%	20%	90%
32	Nasir H. Nassir	FT	Doctoral Cand.	40%	30%	20%	90%
33	Fatima H. Fleih	FT	Doctoral Cand.	40%	30%	20%	90%
34	Shifaa N. Abd Alhassan	FT	Irrigation Eng. 4hrs,1,2;Lab;Proj	40%	30%	20%	90%
35	Saja M. Khazal	FT	Survey, 2hrs,1,2;Lab;Gis Lab;Proj	40%	30%	20%	90%

6.2 Adequacy of size and other description

This section presents some Faculty description that is necessary to serve the undergraduate student such as size, rank, age, and degrees.

Size

Number of faculty member who serve in the program of civil engineering is 35 including the head of department who teach some classes for senior and junior levels. The percentage of student to faculty member is approximately eight, which is less than 15. Teachers are taking about 2-5 credits. At least one course of two credits are serviced for the program. According to the university serve, the teacher shall serve at least 30 hours per week.

Rank

The rank of the faculty of our department are young and so most of them are assistant lecturers. However, there are seven teachers are lecturer and two assistant Prof. The

lecturer ranks are distributed through different specialist such as structure, geotechnique, surveying, water resource, highway engineering, and remote sensing. Figure 6.2 shows bar chart of rank distribution.

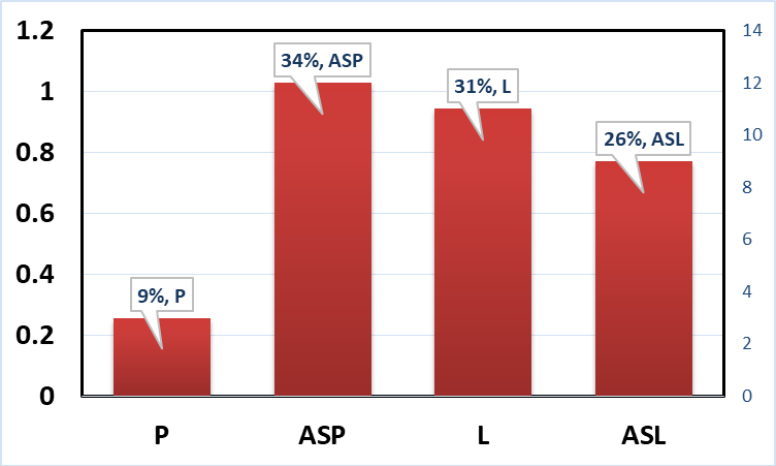


Figure 6.2 Bar chart demonstrates the ranks of the faculty members.

Degree

Figure 6.3 shows the degrees of the faculty member in the civil engineering department. The PhD degrees form only 69% of the total degrees of faculty members. Seventeen percent are PhD candidate. They may accomplish their study after one or two years. The substantial background and the bachelor degree of most of faculty members are civil engineering and building and construction department. The PhD candidates continue their postgraduate studies in reputable universities.

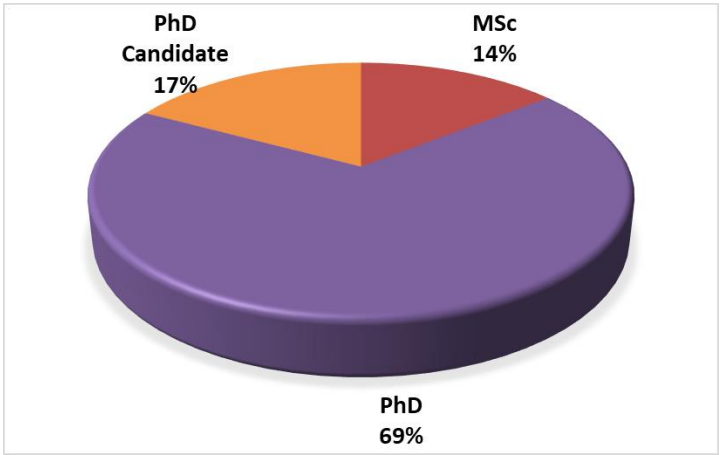


Figure 6.3 Scientific degrees of faculty members.

Age

The average age of the 35 faculty members are 42 and range is approximately 38-47. The ages of the faculty member are stable from view of the retirement.

Years

Average years of service are about 15 year ranging from 20 years to 10 year. It suggests stability.

6.3 Professional development activities

Engaging faculty members in professional development are very important to increase their ability in teaching, advising, and scholar. Faculty member has no support to attend conferences and workshop outside Iraq. However, there is a program developed by the ministry of Higher education for training. Faculty does not attend workshop related to the accreditation to make them familiar with the ICAEE and ABET. Opening postgraduate studies in our college helped in increasing the research.

6.4 Faculty student interaction

There are many opportunities to interact between faculty and student through the classes and schedule hours in the faculty office. However, there should be seminar presented in the department where the student attendance. Through discussing the projects also, good chance to interact with the student. Number of student is about 30 which make abundant to interact with student.

SWOT Analysis

The following point should be developed

1. Offer chances for training to develop the profession of the faculty member
2. Support the faculty members in attending the conference and workshop outside Iraq
3. Support the research which develop the ability of faculty members.

CHAPTER SEVEN

CRITERION 7 ADMINSTRATIVE SUPPORT

7.1 Leadership and Administrative Services

The chairperson of the department starts at 2019. All the functions of the chairperson are listed in laws. The department's organization chart is shown in Figure below

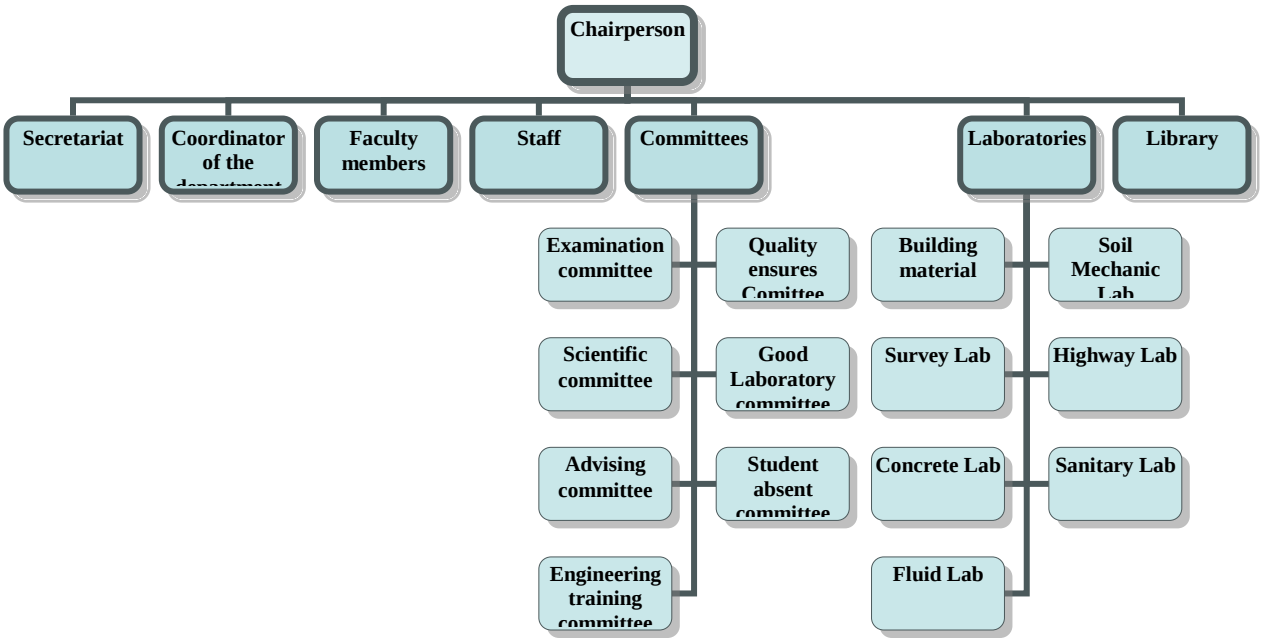


Figure 7.1 The organization structure of the department

Chairperson's Role

The role of chairperson is regulated according to the amendment of MOHSER act (No. 40) of 1988 which consists of

1. Discussing the curricula and text books and suggestion of modification by discussing with faculty members.
2. Suggest the need of department to the faculty members and engineers and inviting the visitors.

3. Recommend the projects and the scientific research that submitted by the faculty members
4. Proposing the scientific committee in the department and monitoring their achievements.
5. Supervising the learning in the program and the methods of learning and teaching In addition to updating the curricula.

Faculty Role and Staff Role

The faculty functions are organized according to the law No. 23 2008 University service act which includes

1. Sponsoring the students intellectually and educationally in the interest of homeland and nation in laying out the foundations of the Iraqi democratic society towards building an upscale humane civilization considering the scientific method of thinking and practice as a tool for achieving those goals.
2. Conducting scientific, applied, theoretical and field instruction, training in laboratories and experimental fields, maintenance of assets and supervise their use, giving theoretical and practical lectures, solving exercises, auditing student's reports and supervising on researches and thesis
3. Conducting scientific researches in various fields.
4. Contribution in university activities such as cultural seasons, university's day, college fairs, graduation ceremonies, student events and other scientific and educational events.
5. Contribution in authoring, translation and publishing
6. Contribution in permanent and temporary boards and committees within and outside the ministry.
7. Contribution in development of scientific departments intellectually, educationally and scientifically, submitting studies, researchers, reports, plans and curricula.
8. Conducting and observation of examination.
9. Contribution in symposiums, conference, and seminars inside and outside Iraq.

10. Conducting studies and researches proposed by government departments, public and private sectors in the scope of cooperation between hos organization and those agencies
11. Conducting administrative tasks entrusted with by MOHSER or the educational institutions.
12. Working in centers or specialized advisory offices of the ministry or its educational institutions.
13. Scientific presence in the institution for at least 30 hours per week to achieve the above paragraph of ths article.

The professor, assistant professor and teacher should submit a report after each semester about his teaching activity, the entire vocabulary curriculum he had finished, problems he had encountered, recommendations proposed for solving them, researches and articles he had published, lectures delivered and proposals for development of curricula and the educational institution he works in.
All the activities mentioned in the lay ensure a full support for the program

Faculty Support

7.2.1 Faculty Recruitment

Process is available to achieve the required faculty members needed for the program. At the beginning of the academic years the department council determine the need and a demand is forwarded to the dean of college to discuss that through college council, then forwarded to the university. It depends n the financial support provided by the Ministry of finance.

7.2.2 Faculty Retention and promotion

The program is supported by a committee from the department which is represented by scientific committee in the department deals with scientific promotion for the faculty members. There is a new regulation for promotion released from MOHSER which is followed by the department to support the program.

7.2.3 Faculty Development Support

Many courses are held by continuing teaching center in the college and university to develop the abilities of the faulty member in learning and teaching methods. For new faculty member, a course shall be learned to make him start with teaching profession. In addition to that the new

faculty member cannot teach student before succeed in an examination held in the university to ensure the ability of teaching.

2.7.3 Technical and Administrative Staff Support

7.3.1 Staff Size and Qualification

These is a good faculty staff in the department that can develop the program. The technical staff and engineers are not enough, in spite of high level technical staff existed in the college which can support the program. There is a process can be followed to increase the technical and engineers in the laboratory and other need depends on temporary agreement. It make that staff enough to support the program.

7.3.2 Staff Recruitment and Retention

Current the staff is enough and no need for plan for that. The percentage of retention is high.

7.3.3 Staff Development

Different courses are organized by the department by the center of continuing education in the college and university which includes developing the computer abilities and maintenance in addition to the administrative work. In many cases some of these courses are utilized in the evaluation of the staff.

CHAPTER EIGHT

CRITERIA 8 FININATIAL SUPPORT

8.1 Funding Resources

This section describes the adequacy of financial resources. The main budget of the program depends on the central budget of the Ministry of Higher education and scientific research (MOHESR) which is prepared yearly. Other minor source of budget can come from the fund box of Higher Education and Scientific research which comes from many sources in addition to the function from evening study and Consultant Bureau.

1.2 Program Budget

Engineering college receives the budget from the Thi-Qar University, which receives the total budget from MOHSER. The support is central. It is distributed according to six primary items, that is, Staff Expenses, Equipment, services, Capital Expenditure, and others. Following are the explanations of expenses of the all of these parts.

Staffs expenses consist of two categorize salaries and allowance (a) Salaries and basic fees: contains salaries, lecture fees, examination fees, committee fees, and rewards. (b)Allowance contains position allowance, university service allowance, risk allowance, location allowance, degree allowance, martial and children allowance.

Table 8.1 shows the details of goods and services. The maintenance details are presented in Table 8.2. The last one is called Capital expenditure which includes non-financial items: (a) Transportation such as saloon cars, heavy duty cars and buses and (b) tools and machines contains wooden furniture,

metal furniture, other furniture, machines, tools, cloning devices, communication tools, computer and security items.

Table 8.1 Details of good and services

Goods and services	Goods and services
Travel expenses	Bonuses adherents
Provisions Night	Stationery
Transportation	Publications
Publishing expenses	The books
Expenses Media	Magazines
Rent and transport	Fuel
Hospitality and delegations and public relations	Clothing
Celebrations	Control material
Postage stamps	Prevention materials
Wages of phone calls	Laboratory supplies
Services Information Network	School Supplies
Conferences and seminars	Agricultural supplies
Copyright	Other supplies
Participate in training courses	Textbooks
Cleaning circuit	Calculators
Translation and authorship	Small office machine

Table 8.2 The details of maintenance and capital expenditure

Capital expenditure	Others	Maintenance
Wooden furniture	Non equivalents associate	Maintenance of water installation
Metal furniture	Allocations pupils	electrical installation maintenance
Other furniture	Sports activities	Maintenance saloon
Appliances		Auto Maintenance pregnancy
Copiers		Maintenance of furniture
Electronic computers		Building Maintenance
		Maintenance of machines and equipment and machinery
		Maintenance of parks and

		gardens and orchards
		Maintenance of books
		Maintenance records

8.2.1 Teaching and Learning Financial Support

The Department manages and monitors its own

The budget that support all the activities of the program includes the operating expenses of the equipment for continuous improvement of undergraduate laboratories, maintenance, functional operations of undergraduate laboratories, over-load teaching, educational support, and staff salaries. It is monitored and managed by the department head and the dean of the college.

8.2.2 Facilities Financial Support

The department prepares a plan for the important equipment, devices, computers, printers and all the tools serve the program. These list can be purchased according to the available budget offered from the college for every program. However, the allocation of fees are very little and the equipment purchased are very little.

8.2.3 Faculty Financial Support

This category includes faculty salaries, overload teaching, evening load teaching and educational support. The program is supported based on the sources of fund according to their category.

8.2.4 Staff Financial Support

This category includes staff salaries, evening load lab teaching and educational support. The program is supported based on the sources of fund according to their category.

SWOT Analysis

The following points are important to be achieved

4. Updating the regulations and laws of the budget so that is can support the program
5. Contribution of the department in planning of the budget
6. Increase the financial support for all the elements of outcomes education based system

1. Strength points

a. Good staff in the college

b. likeness to improve the college.

c. Increase in consulting, continuous teaching, and structural laboratories ravenous.

2. Weakness points

a. No allowance for student

b. No funding for research

c. The financial is centrally distributed.

d. College does not depend on the research funding

e. Difficult in changing the parts of budget

f. Equipments purchased, as part of research grant are very little and depend only on the Ministry of High Education projects.

3. Opportunities

Continuous central budget.

4. Threats:

having a low degree of the performance of the department

CHAPTER NINE

CHAPTER 9 FACILITIES

This section addresses the facilities related to the program such as classrooms, laboratories, and library and the adequacy of them to fulfill the objectives.

9.1 Built Spaces and Associated Equipment

9.1.1 Offices

All offices are equipped with necessary facilities. Each facility can be requested as they needed. A process is available to offer any facility needed. Generally, it depends on the financial support. Every teacher has an office equipped with necessary facilities. Through the last years, a new offices are constructed to obey the need of the faculty member according to process available for this purpose.

9.1.2 Classrooms

Civil engineering courses are taught in four halls. Their areas are presented in Table 6.1. All these halls are equipped with new type of white board and computer projector. Computers are allocated for every stage and saved in the department. Computer projector is equipped for every hall. The chairs are more than number of students. Table 6.2 shows the names of halls and the ratio of student to the area of the hall. Overall, the classroom facilities are in excellent condition. Numbers of halls are adequate. In 2011, all the halls are equipped with data show and laptop computer (Appendix C). The faculty members were encouraged to use different learning tools in the class. Number of seat is always enough.

Table 9.1 Classrooms of civil engineering department

No.	Name of class	Multimedia	Type of writing board	Area (m^2)	Stage	Number of student	Average area for every student in the class
١	Ibn Alhaithem	Computer projector	White board	٨٠	Fourth	٢٩	2.8
٢	Alkindy	Computer projector	White board	٨٠	Third	٥٤	1.5
٣	Alkhawarezmy	Computer projector	White board	٨٠	Second	٥٦	1.4

٤	Alshareef Alrady	Computer projector	White board	٨٠	First	٣٣	2.4

9.1.3 Laboratories

The department maintains several laboratories related to the program. The laboratory contains high quality equipment manufactured in trust companies such as ELE Company in England and Matest in Italy (Appendix B). They are exported in the three years ago. Updating and increasing the equipments is continuous. Table 6.2 shows the area for every space for laboratories. All of the laboratories are in good condition.

Table 9.2 Areas of spaces for laboratories.

Room	course	area	student	Area for every student
	Material lab.	-	33	**-**
	Computer lab.	-	-	**-**
	Survey lab.	60	57	**1.1**
	Concrete lab	70	57	**1.2**
	Fluid lab	-	57	**-**
	Soil lab	120	54	**2.2**
	Highway lab	**182**	**29**	**6.3**

9.1.3.1 Concrete laboratory

The department maintains a concrete laboratory to make the student perform different basic experiments on concrete. The area of the lab is 70 m^2 (7×10). The class is divided into groups each group contains about 7-8 students. The equipment related to the course of concrete are presented in Table 6.3.

Table 9.3 Tools and equipment available for concrete lab.

No.	Description	Qty
1.	ELE Concrete mixer	**2**
2.	ADR 3000 BS compression machine with accessories.(manufactured by ELE International-UK)	**1**
3.	100KN Flexural and transverse (flags) frame & accessories.(Manufactured by ELE International-UK)	**1**
4.	1000/500 KN Compression /Tension machine with 250mm dia. Analogue gauge & accessories.	**1**

5.	Sieve shaker	
6.	Slump test set, B.S & ASTM	**5**
7.	Compacting factor apparatus	**4**
9.	**Auto test 250/50 KN cement lime and motor compression.**	١

- **Laboratory tests:**

1. Standard strength of cement paste.
2. Measuring the freezing time, primary and final cement paste.
3. Compressive strength of the cement.
4. Tensile strength of the cement.
5. Specific weight and the absorption capacity of the rubble.
6. Bulk density of aggregates.
7. Sieve analysis for aggregates.
8. Precipitation examination of fresh concrete.
9. Screening factor compaction of fresh concrete.
10. Compressive strength of hardened concrete.
11. Fission resistance of hardened concrete.
12. Flexure resistance of hardened concrete.

9.1.3.2 Soil Mechanics laboratory

The Department maintains a soils laboratory that is used in teaching Soil Mechanics Laboratory. Students in the class are divided into two main groups. every group is divided into 2-4 groups. The area is 160 m^2. The lab equipment includes the devices presented in Table 6.4.

Table 9.4 Tools and equipment for soil mechanics lab.

	Name of experiments	No of devices	No of student in each group
١	Water content	٢	٦
٢	Specific weight	**6**	٥
٣	Sieves system and appropriate scales	**1**	١٢
٤	Hydrometers and ovens	٤	٧
٥	Atterberg device	٤	٧

٦	Compaction test setting	٤	٧
٧	Sand cone	٢	٩
٨	Cylinder cut	١	٩
٩	Permeability	٢	١٤
١٠	Consolidometers	٤	٧
١١	Direct Shear device	٤	٧
١٢	Unconfined compression test	٢	١٢

9.1.3.3 Roads and Asphaltic Materials Lab

The lab is located at the three workshop. The area was 182 m^2. The lab is part of the course of highway engineering. The student learn how to conduct the experments on asphalt and the mixing.

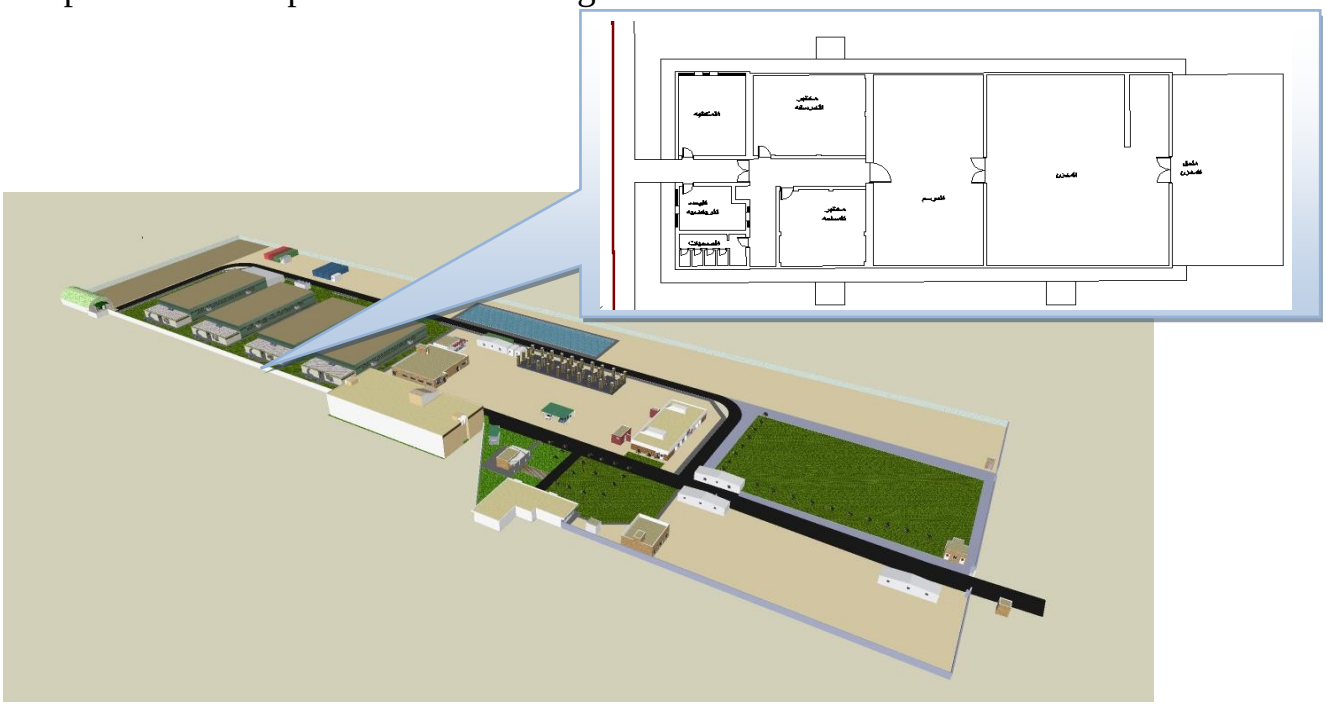


Figure 6.1 Location of Asphalt lab.

Table 9.5 tools available in Asphalt lab.

	Name of device and tools	Number
١	Pans with deferent shapes	8
٢	Handle Shovel	4
٣	Marshall Molds	8
٤	Standards Sieves	2
٥	Tins	8
6	Cylinders	6

Table 9.6 tools available in Asphalt lab.

	Name of device	Number
1	Marshall Stability & Flow	2
2	Extraction Device	2
3	Marshall Hummer	2
4	Penetrometer	5
5	Ductility Device	2
6	Softening Point (Ring &Ball)	2
7	Mechanical Vibratory	2
8	Density Balance	1
9	Electronic Balances	6

The students are divided into number of groups so that the number of student in every group becomes 5 students. The teacher gives the theoretical basis of the experiment at the first time of class then explains the experiment and the equipment used in the experiment. The student conduct the experiment by them self with the help of the engineers and under the supervising of the teacher.

9.1.3.4 Surveying and GIS Lab

The department maintains a survying and GIS lab for the course of survying. The laboratory is located inside the campus in the south east of the college as presented in Figure 6.2, Easting =619067, Northing =3432725. Coordinates system: WGS84 UTM-38N. The area of lab is 61.6m^2 (8m x 7.7m). The experiments are conducted on an area 1750 m^2 (the stadium of the college) (70m x 25m)

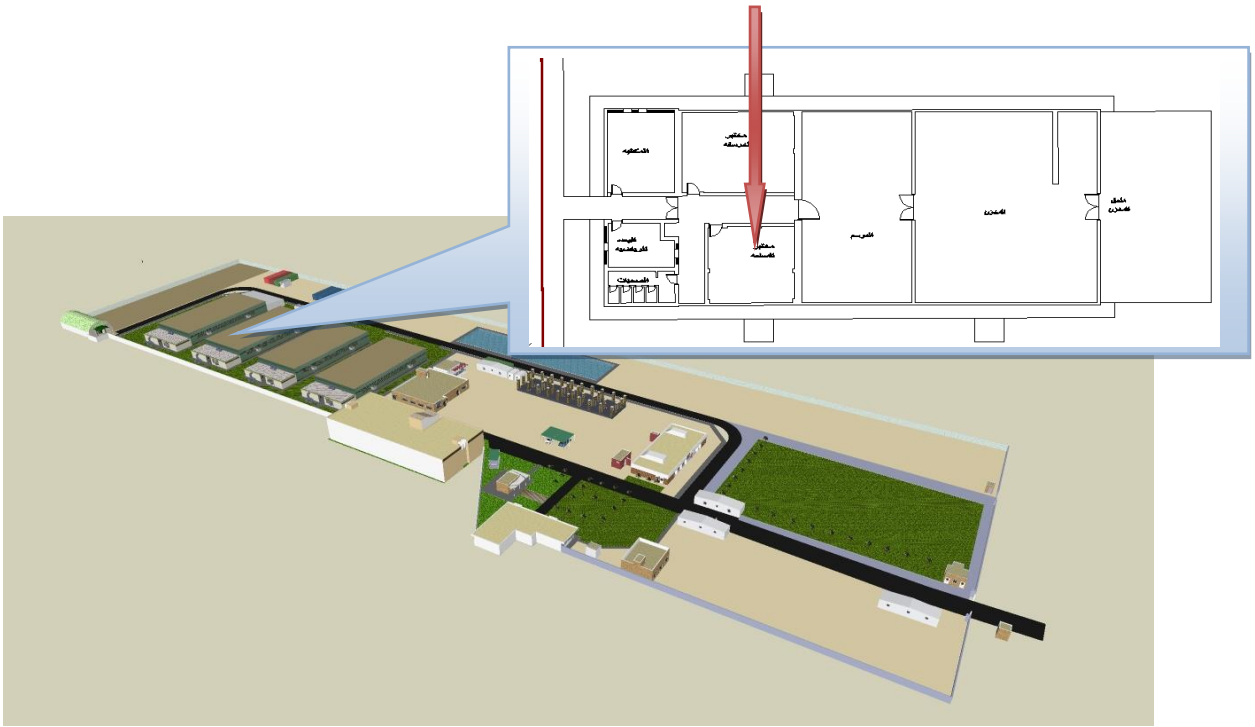


Figure 6.2 Location of GIS lab.

Tools and equipment available in the lab

Table 6.7 and 6.8 show the tools and equipments available in the survey lab.

Table 6.7 tools available in Survey lab.

	Tool name	Number
1	Steel tape (50 m.)	٨
2	Linen tape (50 m.)	4
3	Linen tape (30 m.)	2
4	Linen tape (20 m.)	٤
5	Steel tape (5 m.)	٣
6	Distance Measuring Wheel	6
7	Compass Mercury	٦
8	Pine (80 cm)	٨
9	Wood pegs (30 cm)	20
10	Hammer	4
11	Plumb bob	٤
12	Range Pole	١٨

Table 6.8 tools available in Survey lab.

	Device Name	**Number**
1	Electronic distance measurement (Leica)	**5**
2	Digital Planimeter (PLACOM)	**2**
3	Automatic Optical Level (Topcon ATG-3)	**7**
4	Mechanic Theodolite (Foif)	**5**
5	Electronic Theodolite (Topcon DT-200)	**5**
6	Electronic Total Station (Foif)	٢
7	Electronic Total Station (Topcon GPT-750)	٢
8	Navigation GPS (GARMIN GPSMAP 78s)	٦
9	Single frequency GNSS (GRS1 Topcon)	**2**

9.1.3.5 Mechanism of action of the laboratory

The students are divided into two main groups A and B (Table 6.5). The experiments are performed by the two groups respectively. Each group subdivided into 5 groups. Number of student in the subgroups reach to 5 or 6 students. Different tools are used to explain the experiments such as data show and video.

Table 6.5 Student groups distribution in the Survey lab.

Group B	Group A
B1	A1
B2	A2
B3	A3
B4	A4
B5	A5

2.9.1.4 Campus infrastructure and supportive facilities

9.2 Computing Assets

Computer Facilities

College is equipped with internet service. A room with dimension 28 m^2 is equipped with 10 computers and server. The lab of computer is opened for student at two days in the week. This includes some of the academic buildings on campus. Some of the major software packages available on the department computers for the student use are listed below

• Microsoft Office (Word, Excel, PowerPoint)

. AutoCAD

• STAAD

• MatLAB

9.3 Students Direction and Safety Precautions

9.4 Maintenance and Upgrading of Facilities

In all the laboratories, classes, and offices, a maintenance is offered continually to do the necessary maintenance as needed. Yearly and continuously, the process is performed to repare all the equipment and devices. They are part of the good laboratory project that the program contribute in it to fulfill its requirement.

2.9.5 Library Services

The department has a library specialist with the distribution of textbooks to the student where they are returned to the library at the end of the academic year. Number of textbooks is enough for the student and usually they are updated. The teacher report that the textbook should be updated by send a document to the department head, then the head of the department discuss with the dean of college to update these textbooks.

SWOT analysis

Laboratories are not updated. Very few equipment, very few devices are provided, seven years ago

Other facilities need to be provided

Strengths

1. The desire of the college administration to improve work.
2. The existence of financial support by the Ministry of Higher education and Scientific Research (MOH).

Weaknesses

1. No scientific library in the civil engineering department.
2. Textbooks in the free library are reproduced and may not be clear.
3. Books in the public library are not enough for teachers, researchers, and students.
4. No computers hall for researcher and for senior projects.

5. Laboratory need to increase the number of different devices used in the testing process, which will result in a decrease in the number of students per group so that the optimum number for each total of three students.

6. Laboratory need to land dedicated to testing process in surveying laboratory.

7. Registration Division and students affair unit is small in terms of construction.

Opportunities

No opportunity for development in this criteria

Threats

1. The unwillingness of students to apply for the program, as well as researchers in the work within the college.

Laboratory Equipments

for

Civil Engineering Department

1. Laboratory of concrete and structural material
2. Soil mechanics laboratory
3. Asphalt laboratory
4. Surveying laboratory

Unconfined Compression Device

Flexural Test Device

California Bearing Test Device

Concrete Compression Test Device

Compression Test Device

Cement Mortar Compression Test Device

Consolidation Test Device

CBR Test Device

CBR Test Device

جهاز فحص التحمل الكاليفورني

فرن تجفيف نوع بايندر

Tensile Test Device

جهاز فحص الشد للحديد

Direct Shear Test Device

Specific Gravity and Density Test Device

Concrete Core Test Device

Flash Point Test Device

Concrete Core Test Device

Permeability Test Device

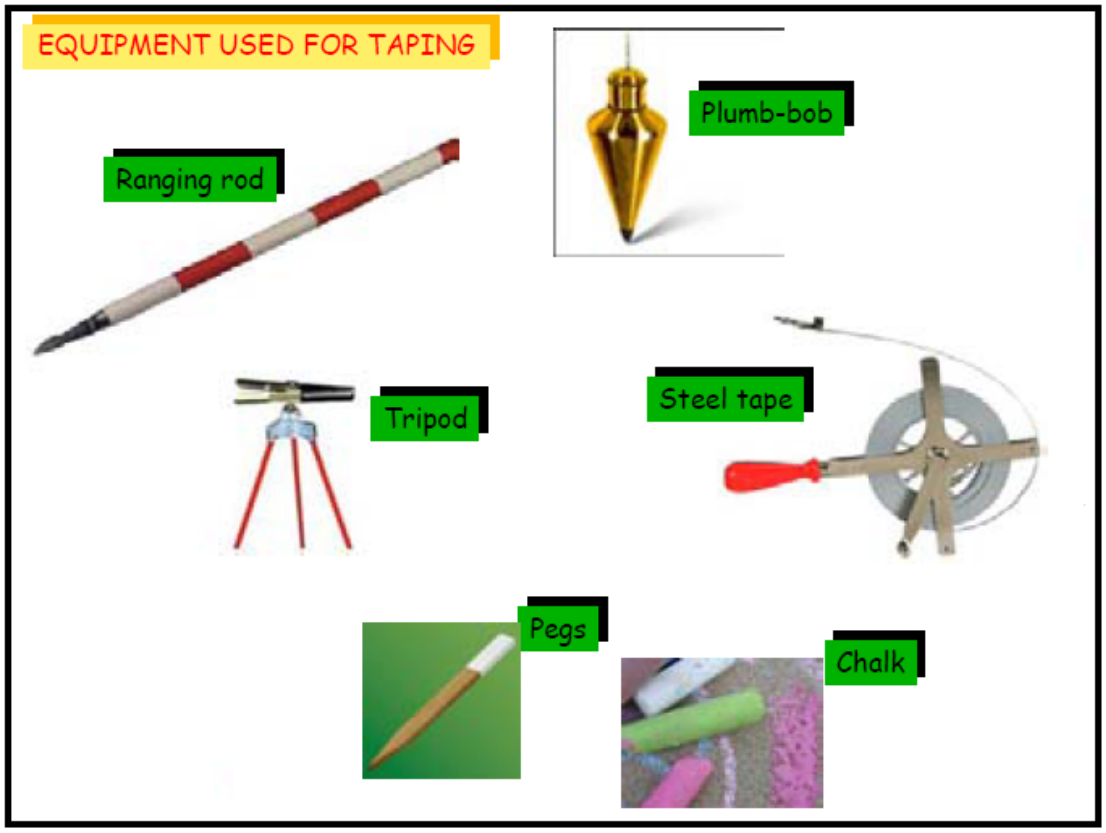
Marshal Device

Water Bath

Concrete Mixture

Asphalt Penetration Test Device

Penetration Test Device



Electronic distance measurement (Leica)

Distance Measuring Wheel

Digital Planimeter (PLACOM)

Automatic Optical Level (Topcon ATG-3)

Mechanic Theodolite (Foif)

Electronic Theodolite (Topcon DT-200)

Electronic Total Station (Foif)

Electronic Total Station (Topcon GPT-750)

Navigation GPS (GARMIN GPSMAP 78s)

Single frequency GNSS (GRS1 Topcon)

Dual frequency GNSS (GR3 Topcon)