

**Kurdistan Regional Government
Ministry of Higher Education and Scientific Research
Erbil Polytechnic University
Erbil Technical Engineering College**



Self- Assessment Report

Refrigeration and Air Conditioning Engineering

Techniques Department

Erbil Technical Engineering College

Erbil Polytechnic University

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Table of Contents

SECTION	Page
Cover of Self -Assessment Report	<i>AC 1</i>
Team of preparation	<i>AC 2</i>
Table of Contents	<i>AC 3</i>
Preface	<i>AC 5</i>
CAHPTER ONE :INTRODUCTION	
1-1 History of the University, College and the Programs	<i>AC 6</i>
1-2 Degree of the Title and Requirements	<i>AC 7</i>
1-3 Type of the Program	<i>AC 7</i>
1-4 Program Activities and College Strategies	<i>AC 8</i>
1-5 The vision of the Department	<i>AC 8</i>
1-6 The Mission of the department	<i>AC 8</i>
1-7 SWOT Analysis	<i>AC 9</i>
CAHPTER TWO: MANAGEMENT AND ORGANIZATION	
2-1 Management and Organization	<i>AC 10</i>
2-2 Mechanisms of Program Planning	<i>AC 11</i>
2-3 Communication Facilities	<i>AC 11</i>
2-4 SWOT Analysis	<i>AC 11</i>
CAHPTER THREE : TEACHING AND LEARNING	
3-1 Student Admission	<i>AC 13</i>
3-2 Evaluating Student Performance	<i>AC 13</i>
3-3 Course Assessments	<i>AC 13</i>
3-4 Performance Grading	<i>AC 15</i>
3-5 Student Feedback	<i>AC 15</i>
3-6 Student Advising	<i>AC 16</i>
3-7 Outcomes of Students	<i>AC 17</i>
3-8 SWOT Analysis	<i>AC 20</i>
CAHPTER FOUR:PROGRAM OUTCOMES	
4-1 ABET Definition	<i>AC 21</i>
4-2 Program Outcomes (PO)	<i>AC 21</i>
4-3 Program Educational Objectives (PEOs)	<i>AC 22</i>
4-4 Relationship between Program Outcomes to Program Educational Obj.	<i>AC 22</i>
4-5 Degree of outcomes	<i>AC 23</i>
4-6 Refrigeration& Air conditioning engineering graduates	<i>AC 24</i>
4-7 Obtaining degree requirement	<i>AC 26</i>

4-8 SWOT Analysis	AC 26
CAHPTE R FIVE: CURRICULUMS	
5-1 Overview	AC 27
5-2 Graduation Requirements	AC 27
5-3 Program Curriculum	AC 27
5-4 Mapping of Course Learning Outcomes to Program Outcomes	AC 30
5-5 Program Delivery and Assessment Methods	AC 32
5-6 SWOT Analysis	AC 33
CAHPTE R SIX: FACULTY	
6-1 Teaching Staff Faculty	AC 34
6-2 Details of Academic Staff Experience	AC 35
6-3 Staff Workload	AC 36
6-4 Development of Teaching Staff Abilities	AC 36
6-5 Faculty Development	AC 37
6-6 Student to Staff Ratio	AC 37
6-7 External Assessor and External Assessment	AC 38
6-8 Roles of External Assessor	AC 38
6-9 The External Assessment	AC 39
6-10 Activities of Presenting Seminars in the Departments and the College	AC 40
6-11 SWOT Analysis	AC 40
CAHPTE R SEVEN: STAFF AND FACILITIES	
7-1 Faculty Offices	AC 41
7-2 Space of Department	AC 41
7-3 Classrooms of Department	AC 42
7-4 Laboratories and Workshop	AC 42
7-5 Department Library	AC 45
7-6 SWOT Analysis	AC 46
CAHPTE R EIGHT :FINACIAL SUPPORT	
8-1 Program Budget Process	AC 47
8-2 Inadequacy of Budget	AC 47
8-3 SWOT Analysis	AC 47
CAHPTE R NINE:SCIENTIFIC RESEARCH	
9-1 Research Strategies	AC48
9-2 Support of the Scientific Research	AC48
9-3 International Publication Book, Paper and Conferences	AC48
9-4 SWOT Analysis	AC49

PREFACE

The present report is the first self-assessment report written for by Department of Refrigeration and Air conditioning Technical Engineering College/ Erbil Polytechnic University. The report represents the first step towards achieving Quality Assurance in accordance with international standards; this report considered as an important impression of the scientific and education process for the department .The decision was adopted by the “General Board” of the department (which includes in its membership all members of the faculty in the department) at its meeting on October 30, 2013. The report coincides with a wide and comprehensive campaign carried out by the Erbil Technical engineering College /Polytechnic University of Erbil in this area and under a central guidance and support from the Ministry of Higher Education and Scientific Research (MOHESR). KRG.

The template format of this report is rely mainly on the previous issued by UNESCO Iraq Office (23-26) October 2013 in Amman, and 3-6 Feb.2014 in Erbil. In addition to a number of similar reports of a number of Arab and international universities that have already prepared presented such a report.

The report includes in its first and second parts a definitive introduction of the department and its history, scientific disciplines and awarded degrees, the system of study and curriculum, organizational structure, the general features of the policy of the department in the various fields and aspects ... etc. After that, the report reviews the required criteria for the self-assessment and the related appendices according to specifications of SAR.

The report also contains a very important article, that is a SWOT analysis for The (Strengths, Weaknesses, Opportunities, and Threats) of the department. SWOT analyses is a very important tool for planning and developing strategies and policies for the office in question, we have tried in our writing of to be very precise in our diagnosis of the strengths and weaknesses, as well as opportunities and threats facing the scientific and educational process of the department.

The report will be reviewed by the experts in the UNESCO. This report involving will be [comments from the review] valuable observations to help us in guiding the department in the correct direction towards ensuring quality and reliability of the educational system of the our department.

CHAPTER ONE INTRODUCTION

1-1 History of the University, College and the Programs

The Erbil Polytechnic University Pursuant to Kurdistan Parliament resolution No. (30) on 09/06/1993 to form a board by name of Technical Institutes Board in Erbil , capital of Kurdistan Region. This board supervised the technical institutes in Erbil, Sulaimani and Duhok. Based on the letter of presidency of Council of Ministers/ Presidency of Divan/ Higher Education Consultancy No. (1929) on 07/08/2012 and pursuant to the directive of Ministry of Higher Education & Scientific Research No. (bureau/970) on 28/08/2012 which concerns changing of Erbil technical education board into Erbil Polytechnic University.

The Erbil Technical College Pursuant to the resolution of Council of Ministers of KRG on 11/09/2003, Erbil Engineering Technical College was founded. Studying started in college in 2004/2005 and included two departments (Technical Construction & Accountancy and Finance) to afford technical bachelor certificate after four years of study and training.

The refrigeration and air conditioning engineering department was established in 2007. The first course started in September 2007 for the academic year 2007-2008. The first Alumni graduated from the department in the academic year 2010-2011, they got B.Sc. degree in the Refrigeration & Air conditioning engineering.

Moreover, the department is participating in conducting many workshops and training courses for local engineers.

1-2 Degree of the title and requirements

The Refrigeration & Air conditioning engineering department offered a Bachelor of Science [B.Sc.] in Mechanical Engineering. The student must satisfy all requirements of the Department which can be summarized as follows.

- Minimum period of study is four (4) years
- Completion of 120 credit hours of course work and this includes
 - 86 credit hours of Refrigeration & Air conditioning subjects
 - 8 credit hours of final year graduation project
 - 16 credit hours of general engineering subjects and mathematics
 - 10 credit hours of humanities and English language subjects and scientific debates
- Fulfillment of two month industrial training (Technical training) during study.
- Minimum pass marks in each course is 50 out of 100 (maximum marks).
- Fulfillment of 90% attendance to theoretical and practical classes.

A student should obtain minimum pass mark in all courses offered also should attend and pass a Technical training course in third class for a period of two months. The industrial Technical training unit of the technical engineering college in refrigeration & air conditioning engineering department is responsible for the placement procedure of the students at the various industries, factories and companies which location available near to the student's home area. The staff from department is in cooperation with the host supervising engineer watched and assessed the performance of the students.

1-3 Type of the program

The program is a full-time education offered during the day. The polytechnic universities adopt an annual study system. The academic year consists of two semesters (30 weeks) with a two-week midyear break between the two semesters and

two months of summer break at the end of the academic year. The assessment is based three exams 1st,2nd and final and also including many quiz and test. Maximum period allowed for a student to obtain the degree is 6 years unless otherwise exempted by legal official reasons.

1-4 Program activities and college strategies

The department endeavors towards the achievement of program objectives. These objectives are in line with the vision and mission objectives of the Erbil technical engineering college. All academic plans and activities decided which are subjected at the Department which is subject to the approval of the Board of Technical Engineering College.

1-5 Vision of the Department

The department our vision is to be pioneer in embodiment of the modern specialization with high quality and obtaining the confidence both inside and abroad. We also aim at preparing modern engineering and technical preparation which is capable of perpetual and growth, so that businessmen and secure the dynamic requirements of Kurdistan region.

1-6 Mission of the Department

- To be able to produce capable engineering graduates who can participate actively in the process of supporting the infrastructure by the way of the department and lead the way in the construction of a sound and productive multidiscipline industry.
- To link between the college researches and the requirements of the technical progress of the community.
- To strengthen the trust of society in the ability of the engineering science .

1-7 SWOT Analysis

S	STRENGTHS (Internal)	W	WEAKNESSES(Internal)
	<ul style="list-style-type: none"> ➤ Dedicated and experienced staff. ➤ Encouraging salaries and wages. ➤ Enthusiasm towards building a reputable Department. ➤ Designed to meet local and international needs. ➤ Good relationship among the staff. 		<ul style="list-style-type: none"> ➤ Insufficient number of qualified staff. ➤ No trained technicians. ➤ No fund for researching. ➤ Less number of office rooms for the faculty. ➤ Level and quantity of students for Large number of transfer students from other universities Inadequate language and communication skills
O	OPPORTINITIES(External)	T	THREATS(External)
	<ul style="list-style-type: none"> ➤ Reasonable budget for purchasing text and reference books. ➤ Possibility of cooperation with existing local state and private industries. ➤ The existence of employment opportunities within the jurisdiction 		<ul style="list-style-type: none"> ➤ Level of incoming students. ➤ Large numbers of holiday. ➤ No hall for library.

CHAPTER TWO

MANAGEMENT AND ORGANIZATION

2-1 Management and Organization

Organizational Structure of department at the Erbil Technical Engineering College includes a set of integrated elements. Each one of these elements of the structure has authorities, duties and responsibilities which are specified accurately. Figure 2.1 shows the organizing structure of the department.

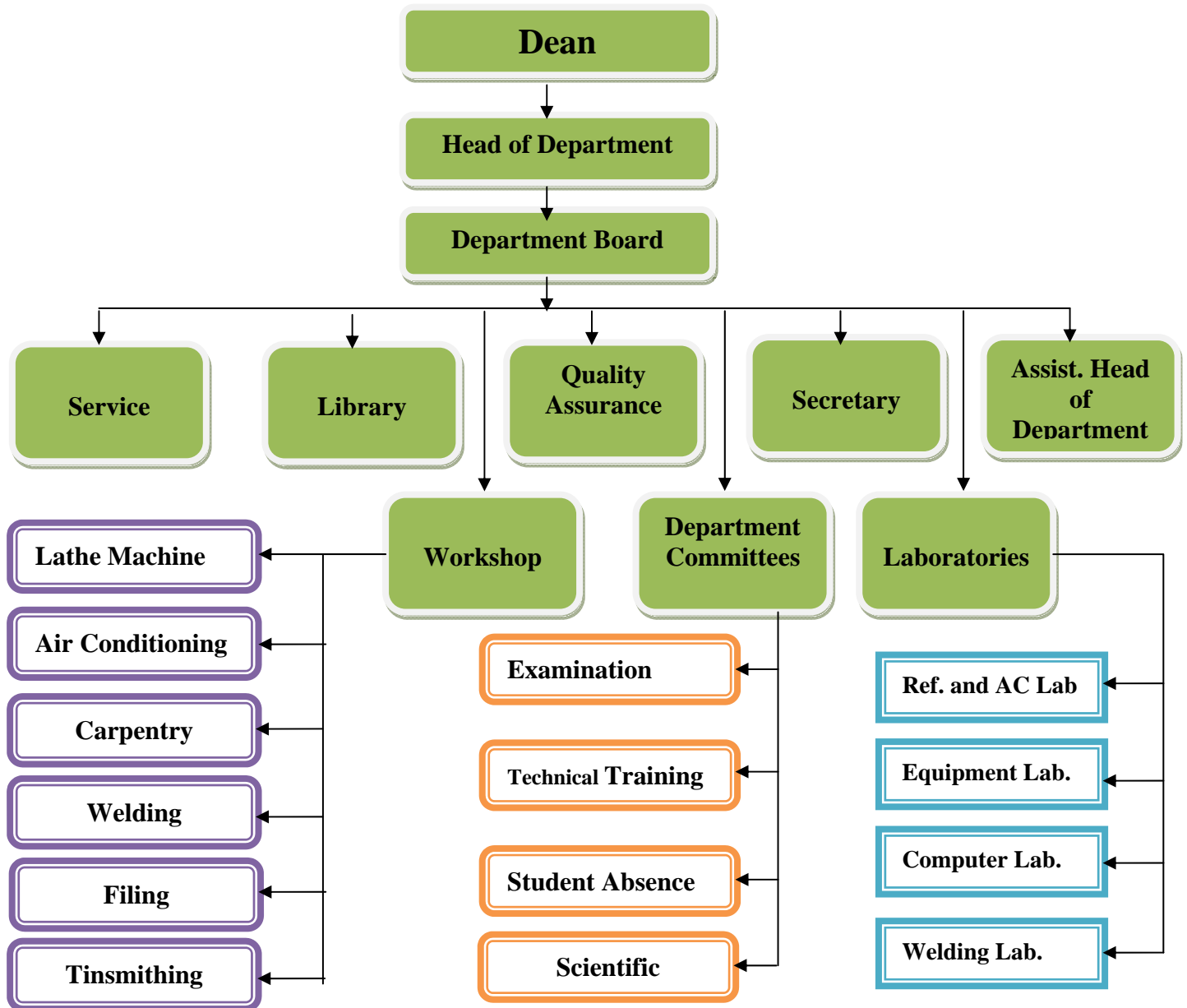


Fig. 2.1 Organizational flowchart of the department

2-2 Mechanisms of Program Planning

The Department is a part of the organizational structure of the Erbil Technical engineering college, program plans firstly are proposed and discussed by Committee and Departmental Board meetings. Then the proposed plans by the Departmental board are submitted to the College Board. The College Board makes decisions in accordance with the Erbil Polytechnic University.

2-3 Communication Facilities

Traditional written memorandum is the main method of communication among the Departments and the College and among all the Departments.

2-4 SWOT Analysis for the Organizational Structure of the Department

To achieve a comprehensive SWOT analysis for the Refrigeration and Air conditioning department Program. The assessment of strengths and weaknesses are facilitated through surveys and information gathering activities of the committees and documentation in the department, and the evidence provided by the faculty and associates. National and regional influences and concerns are important when deciding the strategies and actions to address the weaknesses. In addition, the strategic planning should also address the local and regional threats. Therefore, a group brainstorming, extensive consultations review the local, regional and international developments to the identification of the most relevant opportunities and threats. Table below shows the SWOT analysis for the organizational structure of the Refrigeration and Air Conditioning engineering department.

S	STRENGTHS(Internal)	W	WEAKNESSES(Internal)
	<ul style="list-style-type: none"> ➤ Availability of a good variety of general education subjects. ➤ A very well specifically defined responsibilities and authorities for all committees of the department. ➤ Good social relationships between employees of the department. 		<ul style="list-style-type: none"> ➤ Poor relationship with international research centers and academic institutions. ➤ Weak contact and weak alumni relations. ➤ Insufficient funding for Maintaining, upgrading facilities, Teaching improvement and Research. ➤ Limited excellence for scientific research locally and regionally.
O	OPPORTINITIES(External)	T	THREATS(External)
	<ul style="list-style-type: none"> ➤ Appointment of administrative staff. ➤ Interdisciplinary teaching. 		<ul style="list-style-type: none"> ➤ Imposing programs from the central body that do not match with the specific, size, and requirements. ➤ Lack of sufficient number of quality students with strong interest in engineering. ➤ Level of incoming students (language, analytical thinking, motivation). ➤ Lack of sufficient planning and over loaded admission and transfer programs,

CHAPTER THREE

TWACHING AND LEARNING

3-1 Student Admission

An applicant for admission to an undergraduate program of Erbil Technical Engineering College /Erbil Polytechnic University must satisfy the following requirements:

- He/ She should have a secondary school certificate, or its equivalent certificate (for students whom study abroad) from the Ministry of Education, and majored in natural or technological sciences. The students must obtain a high rate qualifies for admission to Erbil Technical Engineering College.
- Acceptance is centrally controlled by the Ministry of Higher Education and Scientific Research.
- After the distribution of applicants among the universities/colleges, the registration of all students in the college was completed and then they distributed to the scientific departments.

3-2 Evaluating Student Performance

Student performance in each course is assessed using a combination of examinations, quizzes, homework, and laboratory reports. Projects and oral presentations are required in some courses. These evaluation processes are required to pass the students from one stage to another stage.

3-3 Course Assessments

During the period of students study in the department, there is an assessment procedure through

- Some quizzes per days during a year study.
- The response of student through daily examinations.
- Follow-up homework.

➤ First and second semester exams.

The final exam have 50% of the total degrees for the subjects having both the theoretical and experimental parts and 60% for that did not have experimental part, as illustrated in Tables 3-1 and 3-2 respectively, when students are being exams their exam papers are stamped by the examination committee in the department and the teacher of the subject handle these exam papers after withholding names of it, after that the examination committees collect annual degree with the degree of the final exam .

Table (3-1) Mark Distribution of Theoretical subject

100% Final Degree			
40 % Annual Degree			60 % final Exam.
17.5 % 1st Semester	17.5 % 2nd Semester	5 % Annual works (Quiz,classwork and homework)	

Table (3-2) Mark Distribution of Theoretical with lab. Subject

100% Final Degree					
50 % Annual Degree			50 % final Exam.		
17.5 % 1st Semester		17.5 % 2nd Semester		15 % Annual works (experiment, Report and Discussion)	
12.5 % Theoretical Exam.	5 % Practical Lab	12.5 % Theoretical Exam.			5 % Practical Lab

3-4 Performance Grading

A student's performance is graded according to the total marks he/she has obtained in each course subject. Table 3-3 shows the grading schedule.

Table 3-3 Grading Schedule

Marks	Grade
90 - 100	Excellent
80 - 89	Very Good
70 - 79	Good
60 - 69	Medium
50 - 59	Accept
49 and below	Poor
	Fail

3-5 Student Feedback

The average feedback for each subject:

First Year:

Table 3-4 First Year Details

Course No.	Subject	Score of Feedback
AC-101	Kurdology	3.86
AC-102	Mathematics-1-	3.72
AC-103	Engineering Mechanics-Static & Dynamic	2.72
AC-104	Thermodynamics	3.26
AC-105	Workshop & Factories	*
AC-106	Scientific Debate	3.70
AC-107	Engineering Drawing & Descriptive Geometry	4.29
AC-108	Computer Application	4.11
AC-109	English	3.82

Second year:

Table 3-5 Second Year Details

Course No.	Subject	Score of Feedback
AC-201	Manufacturing Methods and Welding Technology	3.33
AC-202	Mathematics-2-	2.86
AC-203	Equipment Technology & Maintenance (I)	2.93
AC-204	Strength of Materials	3.58
AC-205	Engineering Materials	2.5
AC-206	Fluid Mechanic	3.26

AC-207	Refrigeration & Air-conditioning (I)	3.44
AC-208	Electrical Engineering	3.85

Third year:**Table 3-6 Third Year Details**

Course No.	Subject	Score of Feedback
AC-301	Numerical & Engineering Analysis	3.38
AC-302	Computer Application	3.09
AC-303	Theory & Design of Machines	3.56
AC-304	Internal Combustion Engine	
AC-305	Equipment Technology & Maintenance (II)	2.91
AC-306	Refrigeration & Air-conditioning (II)	4.00
AC-307	Heat Transfer	3.59
AC-308	Electronic & Electric Engineering	3.28
AC-309	Technical Training	3.21

Fourth year:**Table 3-7 Fourth Year Details**

Course No.	Subject	Score of Feedback
AC-401	Industrial Management & Quality Control	3.71
AC-402	Control Engineering Circuits & Measurement Apparatuses	3.13
AC-403	Air-conditioning systems Design	3.21
AC-404	Theory of Vibration	3.84
AC-405	Refrigeration	3.28
AC-406	Power Plants	3.53
AC-407	Computer Aided Design (CAD)	3.16
AC-408	Refrigeration & Air-conditioning System Drawing	3.98
AC-409	Project	*

3-6 Students Advising

At the commencement of new academic year and upon admission of new first-year students, a welcome committee will be established which is including staff from all the four Departments as well senior students. This committee provides academic advising services and support for the first-year engineering students in their transition from high school to the

rigorous academic university life. New first-year Refrigeration and Air-conditioning students get further advice through Department briefings in which the Head of the Department, the Reporter and some of the senior staff give general information and talks about the teaching-learning and assessment processes and career opportunities for Refrigeration & Air-conditioning and their role in developing and welfare of the society. Student Advising Unit at the College level includes members from all the Departments give advice regularly to all the students of the College in the various academic and nonacademic matters. In addition, students are promoted to consult the Department faculty whenever they need of advice. The tables and figures of the student as shown in table 3-7, 3-8 and 3-9 and 3-1, 3-2 and 3-3

3-7 Outcomes of Students

Graduating of engineering in the fields of:

1. Refrigeration & Air conditioning Design
2. Refrigeration & Air conditioning Equipment
3. Thermal power engineering

Table 3-8 Numbers of Students

No	Stages	2009-2010		2010-2011		2011-2012		2012-2013	
		Male	Female	Male	Female	Male	Female	Male	Female
1	First Stage	24	10	28	31	23	13	30	16
2	Second Stage	24	8	23	11	26	28	22	12
3	Third Stage	32	22	27	8	23	13	23	27
4	Fourth Stage	-	-	32	23	26	9	23	12

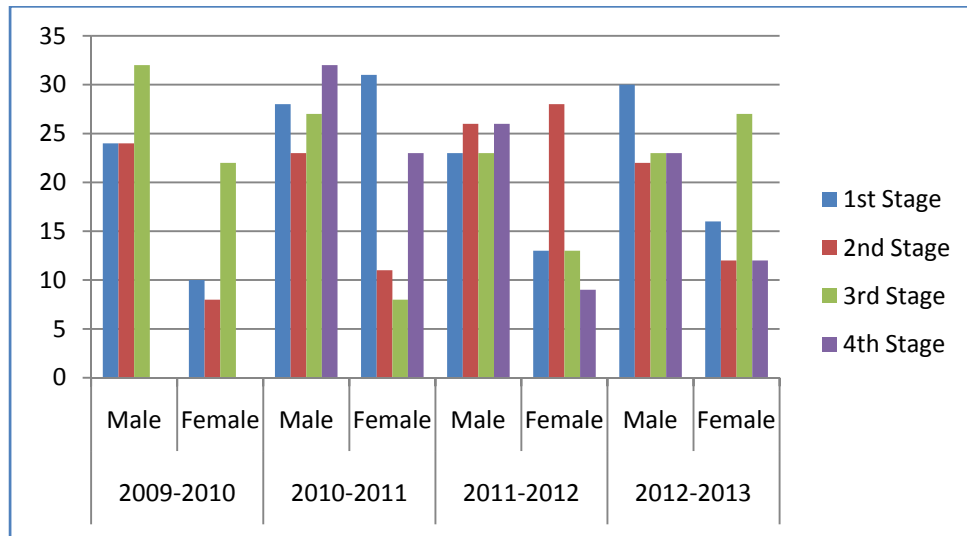


Figure 3-1 Chart number of Student

Table 3-9 Numbers of students in first stage and attendant percent:

Department	Year	Plane of Acceptance	Accepted Student	No. of Students		Highest score	Lowest score
				Male	Female		
Ref.and AC	2009-2010	25	34	24	10	584	570
Ref.and AC	2011-2012	25	59	28	31	625	601
Ref.and AC	2012-2013	25	34	23	11	595	580
Ref.and AC	2013-2014	25	50	30	20	626	605

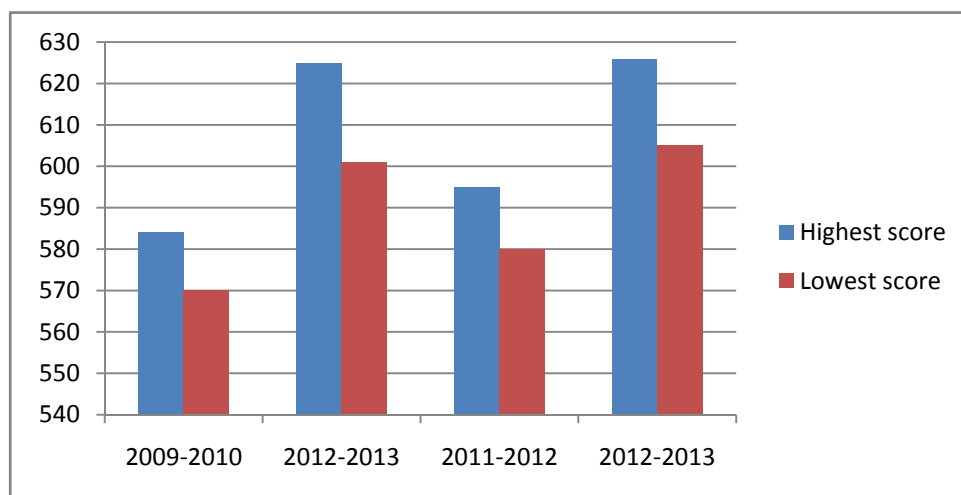


Figure 3-2 Chart High and low score of Student

Table 3-10 Graduation Number of Student:

Year	No. of Students		Total
	Male	Female	
2010-2011	31	24	55
2011-2012	24	10	34
2012-2013	22	10	32

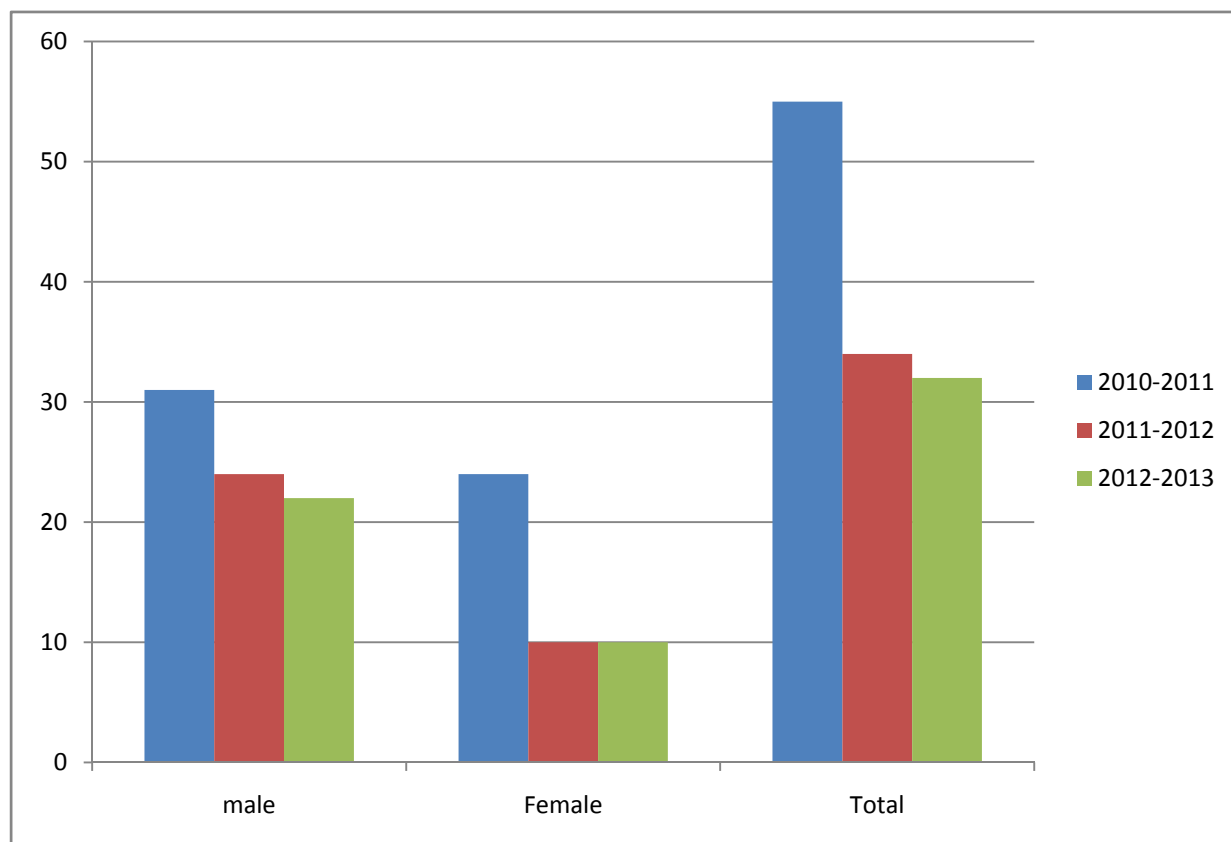


Figure 3-3 Graduation Number of Student:

3-8 SWOT ANALYSIS

S	STRENGTHS(Internal)	W	WEAKNESSES(Internal)
	<ul style="list-style-type: none"> ➤ High and increasing percentage of admission into department ➤ Adequate classroom number and capability. ➤ 		<ul style="list-style-type: none"> ➤ The great and mostly not related to the student desire to study in a specific field. ➤ Admission based on Inadequate language and communication Skills. ➤ Weak contact and weak alumni relations. ➤ High percentage of unsuccessful results. ➤ Lack of motivation due to unclear future prospective.
O	OPPORTINITIES(External)	T	THREATS(External)
	<ul style="list-style-type: none"> ➤ New study programs for more interaction with the requirements of industry. ➤ Community development and interaction with the surroundings by practical work. ➤ Getting employment especially in industrial construction in private sectors. 		<ul style="list-style-type: none"> ➤ Acceptance of large number of transfer students beyond the capacity of the Department. ➤ level of incoming students (language, analytical thinking, motivation). ➤ Availability of private sector for high education. ➤ There are no feasibility studies for needs of graduated students. ➤ The trend for increasing admission numbers without adequate logistics.

CHAPTER FOUR

PROGRAM OUTCOMES

4-1 ABET Definition

Program outcomes are narrower statements which is described what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program.

4-2 Program Outcomes (PO)

The program outcomes of the Bachelor of Science in Refrigeration and Air Condition Engineering and according to the ABET definition are as follows:

- A. An ability to apply knowledge of mathematics, science, and engineering
- B. An ability to design and conduct experiments, as well as to analyze and interpret data
- C. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- D. An ability to function on multidisciplinary teams
- E. An ability to identify, formulate, and solve engineering problems
- F. An understanding of professional and ethical responsibility
- G. An ability to communicate effectively
- H. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- I. A recognition of the need for, and an ability to engage in life-long learning
- J. A knowledge of contemporary issues
- K. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

4-3 Program Educational Objectives (PEOs)

Our Engineering graduates in Refrigeration and Air conditioning engineering department will:

1. Address the challenges that will face in their careers.
2. Pursue life-long learning to develop their problem-solving skills.
3. Exhibit leadership and team-building skills.
4. Provide quality service to the profession, to our government, and to our society.
5. Function as effective members of interdisciplinary teams.
6. Apply current and innovative engineering technologies and criteria.

4-4 Relationship between Program Outcomes to Program Educational Objectives

Program Outcomes outlined reflect a foundation of knowledge and skills. Program Outcomes must be designed to ensure ABET criteria (a - k) which are met the Engineering program. The Program Outcomes will be developed and approved by the faculty during a meeting. The Following Table shows the listing of our program educational objectives which are reflecting their relationship with ABET's outcomes. The alignment of the program outcomes (PO) with the program educational is shown in Table 4-1.

Table 4-1: Relation between PO and PEO

<i>The department</i>		Program Educational Objectives (PEO)					
		1	2	3	4	5	6
Program Outcomes (PO)	A	☀	☀		☀		
	B	☀					
	C	☀	☀				
	D	☀	☀				
	E		☀				
	F		☀				
	G		☀		☀		
	H			☀			
	I			☀			
	J					☀	☀
	K				☀		

4-5 Degree of outcomes

Program outcomes for undergraduate students in the Department

- A. Instilling a sense of responsibility as professional member of society.
- B. Prepare the air conditioning engineering Students to have effective workplace skills.
- C. Prepare the air conditioning engineering Students to have the ability for designing systems, components, or processes to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical,

health and safety, manufacture ability, and sustainability.

- D. The broad area of education is necessary to understand the impact of the engineering solutions in a global, economic, environmental, and societal context.
- E. An ability to use the techniques, skills, and the modern engineering tools which is necessary for engineering practice.

4-6 Refrigeration & Air conditioning engineering graduates.

- 1- Knowledge of chemistry and calculus based physics with depth in at least one.
- 2- Ability to apply advanced mathematics through multivariable calculus and differential equations
- 3- Familiarity with statistics and linear algebra.
- 4- The ability to work professionally in both thermal and mechanical systems areas including the design and realization of such system.

First Year:

Table 4-2: First Year Detail of degree of outcome

Course Code	Subject	A	B	C	D	E
AC-101	Kurdology	☀				
AC-102	Mathematics-I-					☀
AC-103	Engineering Mechanics-Static & Dynamic			☀		
AC-104	Thermodynamics			☀		
AC-105	English	☀				☀
AC-106	Scientific Debate		☀		☀	
AC-107	Engineering Drawing & Descriptive Geometry			☀		☀
AC-108	Computer Application					☀
AC-109	Workshop & Factories		☀			

Second Year:**Table 4-3: Second Year Detail of degree of outcome**

Course Code	Subject	A	B	C	D	E
AC-201	Manufacturing Methods and Welding Technology	☀		☀		
AC-202	Mathematics-II-					☀
AC-203	Equipment Technology & Maintenance (I)	☀			☀	
AC-204	Strength of Materials			☀		
AC-205	Engineering Materials			☀		
AC-206	Fluid Mechanic			☀		
AC-207	Refrigeration & Air-conditioning (I)			☀		
AC-208	Electrical Engineering			☀		☀

Third Year:**Table 4-4: Third Year Detail of degree of outcome**

Course Code	Subject	A	B	C	D	E
AC-301	Numerical & Engineering Analysis					☀
AC-302	Computer Application					☀
AC-303	Theory & Design of Machines			☀		
AC-304	Internal Combustion Engine			☀		
AC-305	Equipment Technology & Maintenance (II)			☀		
AC-306	Refrigeration & Air-conditioning (II)			☀		
AC-307	Heat Transfer			☀		
AC-308	Electronic & Electric Engineering		☀			
AC-309	Technical Training	☀	☀	☀	☀	☀

Fourth Year:**Table 4-5: Fourth Year Detail of degree of outcome**

Course Code	Subject	A	B	C	D	E
AC-401	Industrial Management & Quality Control			☀		
AC-402	Control Engineering Circuits & Measurement Apparatuses		☀			
AC-403	Air-conditioning systems Design			☀		

AC-404	Theory of Vibration			☀		
AC-405	Refrigeration			☀		
AC-406	Power Plants			☀		
AC-407	Computer Aided Design (CAD)					☀
AC-408	Refrigeration & Air-conditioning System Drawing			☀		
AC-409	Project	☀	☀		☀	☀

4-7 Obtaining degree requirements

1. Completing of four years study successfully in Refrigeration and Air conditioning department as a minimum time of study.
2. Participating in summer training

4-8 SWOT Analysis

S	STRENGTHS(Internal)	W	WEAKNESSES(Internal)
O	OPPORTUNITIES(External)	T	THREATS(External)
	<ul style="list-style-type: none"> ➤ The department vision, mission, and objectives focus on the graduates and the overall knowledge they get to apply in their future carrier. ➤ Enthusiastic and dynamic young staff members. 		<ul style="list-style-type: none"> ➤ Inaccuracy the results of questionnaires. ➤ Quality of students. ➤ Less Number of well trained technicians. ➤ Less Number of qualified and well experienced staff.
	<ul style="list-style-type: none"> ➤ The possibility of new staff appointment. ➤ Community Service is the main item of the department’s mission. 		<ul style="list-style-type: none"> ➤ The program outcomes (a-k) do not fully accomplish the PEO3 which focuses on the contributions of the graduates to the welfare of the society. ➤ Absence of Industry Advisory Committee. ➤ Career opportunity for graduates. ➤ No clear government plans for appointment of graduates.

CHAPTER FIVE

CURRICULUMS

5-1 Overview

The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific subjects. The professional component must include:

- A. A combination of mathematics and basic sciences general education component (some with experimental experience) appropriate to the discipline.
- B. Engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study.
- C. A general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.

5-2 Graduation Requirements

To graduate, students have to complete 120 credit hours during four academic years study..

5-3 Program Curriculum

The Bachelor of Science (B.Sc.) in Refrigeration and Air Conditioning Engineering approved by the Department. Includes branches, A lot of curriculums, and specialization of the Engineering is made in the third and fourth years in specialized subjects taught to the student. A curriculum detail Refrigeration and Air conditioning engineering department is divided into four academic years. In each year the students are required to complete exclusive laboratory works which is a part from the room works. After completion of third year, the students take an industrial training in

different government or private sector organizations to become familiar with different and governmental environment. At the last year the students carry out a project-work in partial fulfillment of their regular course-work. Tables Below shows the courses offered during four academic years and the credit hours of each course.

First year:

Table 5-1: First year Program Curriculum

No	Subject	Hours/Week			Unit	Types of Subject
		Th.	Pr.	Total		
1	Kurdology	2		2	4	General
2	Mathematics -I-	3		3	6	Auxiliary
3	Engineering Mechanics-Static& Dynamic	4		4	8	Auxiliary
4	Thermodynamics	3		3	6	Specialized
5	Workshop &Factories		8	8	8	Auxiliary
6	Scientific Debate	2		2	4	Auxiliary
7	Engineering Drawing& Descriptive Geometry		3	3	3	Auxiliary
8	Computer Application	1	2	3	4	Auxiliary
9	English	2	-	2	4	General
Total		17	13	30	47	

Second year:**Table 5-2: Second year Program Curriculum**

No	Subject	Hours/Week			Unit	Types of Subject
		Th.	Pr.	Total		
1	Welding Technology	2	2	4	6	Specialized
2	Mathematics-II-	3		3	6	Auxiliary
3	Equipment Technology & Maintenance (I)	2	2	4	6	Specialized
4	Strength of Materials	2	2	4	6	Auxiliary
5	Engineering Materials	2	2	4	6	Specialized
6	Fluid Mechanics	3	2	5	8	Specialized
7	Refrigeration & Air-conditioning (I)	2	2	4	6	Specialized
8	Electrical Engineering	2	2	4	6	Auxiliary
Total		18	14	32	50	

Third year:**Table 5-3: Third year Program Curriculum**

No	Subject	Hours/Week			Unit	Types of Subject
		Th.	Pr.	Total		
1	Numerical & Engineering Analysis	3		3	6	Auxiliary
2	Computer Application	1	2	3	4	Specialized
3	Theory & Design of Machines	2	2	4	6	Specialized
4	Internal Combustion Engine	2	2	4	6	Specialized
5	Equipment Technology & Maintenance (II)	2	2	4	6	Specialized
6	Refrigeration & Air-conditioning (II)	2	2	4	6	Specialized
7	Heat Transfer	2	2	4	6	Specialized
8	Electronic & Electric Engineering	2	2	4	6	Auxiliary
9	Technical Training	Two months			4	
Total		16	14	30	50	

Fourth year:**Table 5-4: fourth year Program Curriculum**

No	Subject	Weekly Hours			Unit	Types of Subject
		Th.	Pr.	Total		
1	Industrial Management & Quality Control	2		2	4	Auxiliary
2	Control Engineering Circuits & Measurement Apparatuses	2		2	4	Specialized
3	Air-conditioning systems Design	2	2	4	6	Specialized
4	Theory of Vibration	2	2	4	6	Specialized
5	Refrigeration	2	2	4	6	Specialized
6	Power Plants	2	2	4	6	Specialized
7	Computer Aided Design (CAD)	1	2	3	4	Specialized
8	Refrigeration & Air-conditioning System Drawing		3	3	3	Specialized
9	Project		2	2	2	Specialized
Total		13	15	28	41	

5-4 Mapping of Course Learning Outcomes to Program Outcomes

An academic program is, in effect, the superposition of a set of courses, somehow, linked together to achieve program outcome. This means that courses in any academic program represent the building blocks of that program. Assessment of the program would only be possible if the course learning outcomes are mapped to the program outcomes. Course learning outcomes of individual program courses are listed in the detailed course syllabus which are prepared by faculty teaching that particular course and submitted to the student in the beginning of the year. Each year, immediately after tallying the final grades of all courses, mapping between the courses and program outcomes is also established. Mapping of all the courses offered by the department is given below in Table 5-5.

Table 5-5 Mapping of Curriculum with PO

Course Code	Subject	Emphasis Level to the Program Outcomes										
		A	B	C	D	E	F	G	H	I	J	K
AC-101	Kurdology	☀					☀					
AC-102	Mathematics-1-	☀			☀	☀						☀
AC-103	Engineering Mechanics- Static & Dynamic	☀	☀	☀	☀	☀				☀	☀	☀
AC-104	Thermodynamics	☀	☀			☀			☀	☀	☀	
AC-105	Workshop & Factories	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀
AC-106	Scientific Debate											
AC-107	Engineering Drawing & Descriptive Geometry	☀	☀						☀	☀		
AC-108	Computer Application					☀		☀		☀	☀	☀
AC-109	English			☀		☀		☀		☀		
AC-201	Welding Technology	☀	☀	☀			☀	☀				☀
AC-202	Mathematics-2-	☀			☀	☀						☀
AC-203	Equipment Technology & Maintenance (I)	☀		☀		☀		☀				
AC-204	Strength of Materials	☀		☀	☀	☀	☀		☀	☀		
AC-205	Engineering Materials	☀	☀		☀				☀			
AC-206	Fluid Mechanic	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	
AC-207	Refrigeration & Air- conditioning (I)	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	
AC-208	Electrical Engineering	☀	☀			☀			☀			☀
AC-301	Numerical & Engineering Analysis	☀			☀							
AC-302	Computer Application	☀			☀			☀		☀	☀	☀
AC-303	Theory & Design of Machines	☀	☀	☀	☀	☀				☀	☀	☀
AC-304	Internal Combustion Engine	☀	☀	☀	☀	☀			☀	☀	☀	
AC-305	Equipment Technology & Maintenance (II)	☀	☀	☀			☀	☀		☀	☀	☀

AC-306	Refrigeration & Air-conditioning (II)	☀	☀	☀	☀	☀		☀	☀	☀	☀	☀
AC-307	Heat Transfer	☀	☀	☀	☀	☀					☀	☀
AC-308	Electronic & Electric Engineering		☀			☀				☀	☀	
AC-309	Technical Training	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀
AC-401	Industrial Management & Quality Control	☀	☀			☀	☀	☀	☀	☀	☀	☀
AC-402	Control Engineering Circuits & Measurement Apparatuses	☀	☀	☀	☀	☀	☀	☀	☀	☀		
AC-403	Air-conditioning systems Design		☀	☀	☀	☀	☀	☀	☀	☀	☀	☀
AC-404	Theory of Vibration	☀	☀	☀	☀	☀	☀	☀	☀	☀		
AC-405	Refrigeration	☀	☀	☀	☀	☀	☀	☀	☀		☀	☀
AC-406	Power Plants	☀	☀	☀	☀	☀	☀	☀	☀	☀		
AC-407	Computer Aided Design (CAD)	☀	☀	☀			☀	☀	☀	☀		
AC-408	Refrigeration & Air-conditioning System Drawing	☀	☀	☀	☀		☀	☀	☀	☀		☀
AC-409	Project	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀

5-5 Program Delivery and Assessment Methods

The Department adopts the traditional teaching-learning method. The method includes the use of classroom instruction, tutorials, assignments, conducting lab experiments, short projects, seminar presentation and attendance, industrial visits and summer training programs and final-year graduation projects. On the other hand, students are assessed through various modes such as examinations, assignments, quizzes, class work, homework, oral presentations, reports, and class participation.

5-6 SWOT Analysis

S	STRENGTHS(Internal)	W	WEAKNESSES(Internal)
	<ul style="list-style-type: none"> ➤ Availability of a good variety of general education subjects. ➤ A strong professional component. ➤ The used textbooks are updated by the adequate delivery and assessment processes. 		<ul style="list-style-type: none"> ➤ Central control of curriculum development. ➤ Lack of attention to give courses in English, especially in the scientific discussion within the classroom. ➤ Lack concentration of curriculum to teach students to work in team. ➤ Lack of allocation enough credit hours to acquire good skills in computer programs that needed for the Ref. and AC engineer.
O	OPPORTUNITIES(External)	T	THREATS(External)
	<ul style="list-style-type: none"> ➤ The possibility of utilizing new Technical learning methods. ➤ Possibility of re-designing curriculum and by-laws to allow multi-disciplinary. 		<ul style="list-style-type: none"> ➤ Level of students (lack of enthusiasm and learning ambition). ➤ Difficulty coupling with international universities. ➤ Discontinuity with advanced technologies. ➤ Each faculty member can only change 20% of the curriculum contents.

CHAPTER SIX

FACULTY

6-1 Teaching Staff Faculty

One of the most important elements in the college is our teaching staff. The staffs are responsible for the design, review, and maintenance of the curriculum and the teaching of the subjects and laboratories to insure consistency with the educational program objectives. Moreover the staffs are charged to prepare students with very diverse backgrounds to become successful engineers. The faculty consisting of full-time academic teaching which staffs are appointed as full-time. While the remaining are teaching according to an agreement of contract. The number of academic staff , their academic qualifications and ranks including those who are on study leaves are shown in Table 6-1 and Figure 6-1 for the academic years 2012/2013 and 2013/2014.

Table 6-1 Numbers of Academic Staff

Academic Rank	Qualification	2012/2013		2013/2014	
		Appointment	Contract	Appointment	Contract
Asst. Professor	Ph. D.	2	0	2	1
Lecturer	Ph. D.	4	1	4	0
Asst. Professor	M. Sc.	0	1	0	0
Lecturer	M. Sc.	1	1	1	1
Asst. Lecturer	M. Sc.	11	0	11	0
Total		21		20	

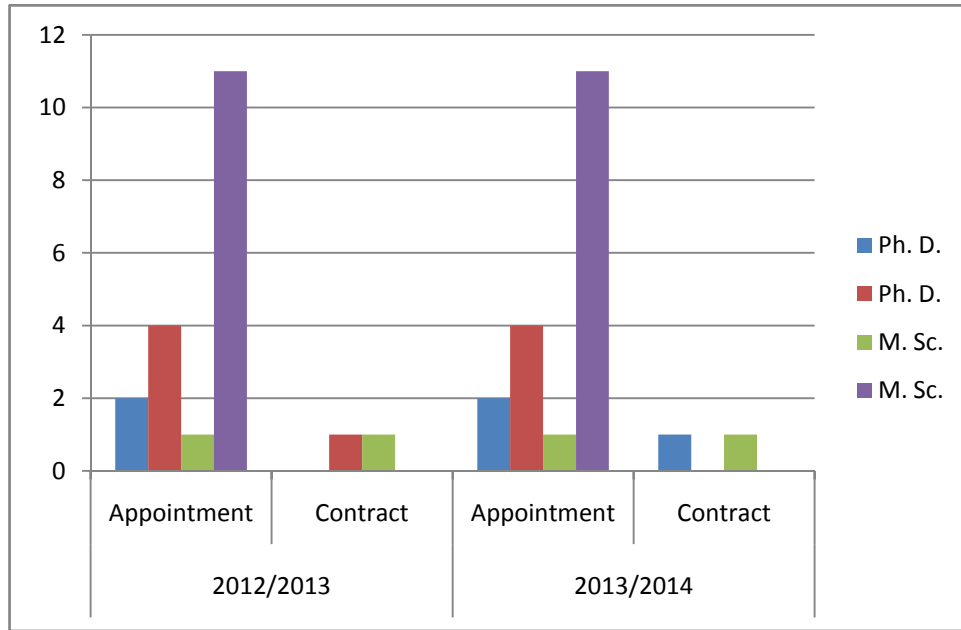


Figure 6-1 Number of Academic Staff

6-2 Details of Academic Staff Experience

This article describes the qualifications, posts, experience and areas of specialization of the academic staff of the Refrigeration and Air Conditioning Engineering Department. The details are shown in Figure 6-2.

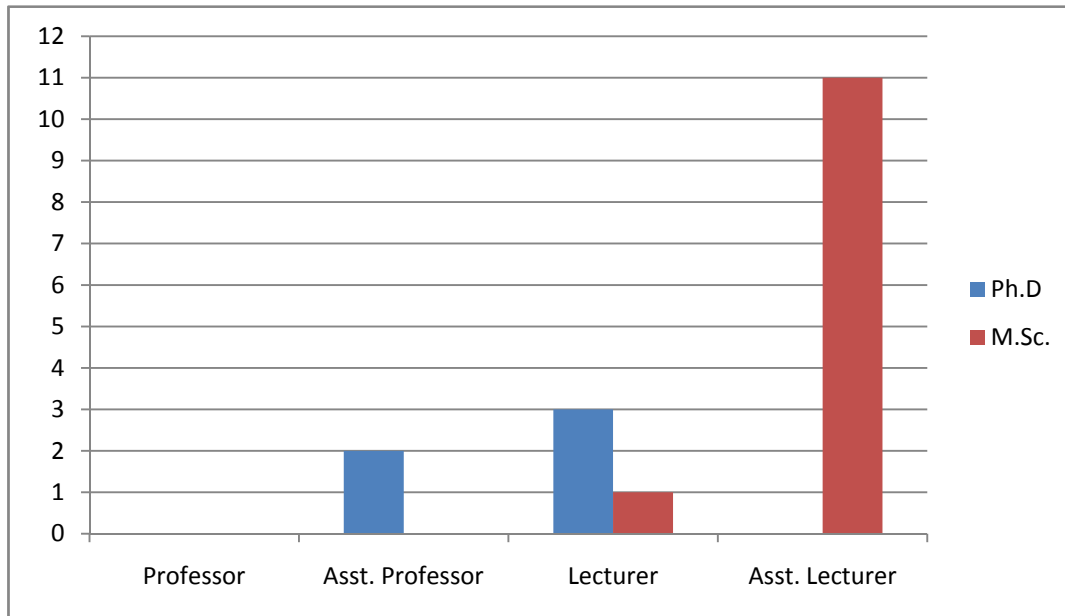


Figure 6-2 Academic post of department Staff

6-3 Staff Workload

The teaching load is distributed according to the academic rank of a staff member. The maximum load (class hours/week) assigned to a staff member is limited by University regulations as shown in Table 6-2. A staff member taking extra load is entitled for additional payment. Administrative duties assigned to the staff reduce the maximum teaching load.

Table 6-2 Maximum Teaching Load Distribution

Academic Rank	Professor	Asst. Prof.	Lecturer	Asst. Lecturer
Maximum Load(hrs/week)	6	8	10	12

6-4 Development of Teaching Staff Abilities

The academic staff can be developed and encouraged by

- (1) Teaching and education activities;
- (2) Research and scholarly activities.
- (3) Participation in the professional societies and conferences.

To various degrees, the faculties have been involved in:-

- A. Education : Course/Curriculum Development , Textbooks, Technology tools in classroom
- B. Research : Publication papers in Journals,
- C. Participating in conferences, workshops, attending in seminars
- D. Presenting seminars,
- E. Committee Participation: Department, College , and University levels (membership, chair duties),
- F. Industry Collaboration: Consulting , industry projects, and part-time Employment,
- G. Quality assurance: the process of continuous learning imposes staff to attend

seminars, workshops, conferences, conducting and publishing papers...etc. during academic year.

6-5 Faculty Development

The Faculty professional development activities are included attending seminars and lectures, participation in training workshops, attending professional conferences, professional writing activities, review activities, conducting new and original research, training programs inside and outside KRG.

6-6 Student to Staff Ratio

The number of staff / student and ratio of them are shown in following Table 6-3 and figure 6-3

Table 6-3 Student to Staff Ratio

2012-2013			2013-2014		
Student Number	Staff number	Student / Staff	Student Number	Staff number	Student / Staff
170	21	8	196	20	10

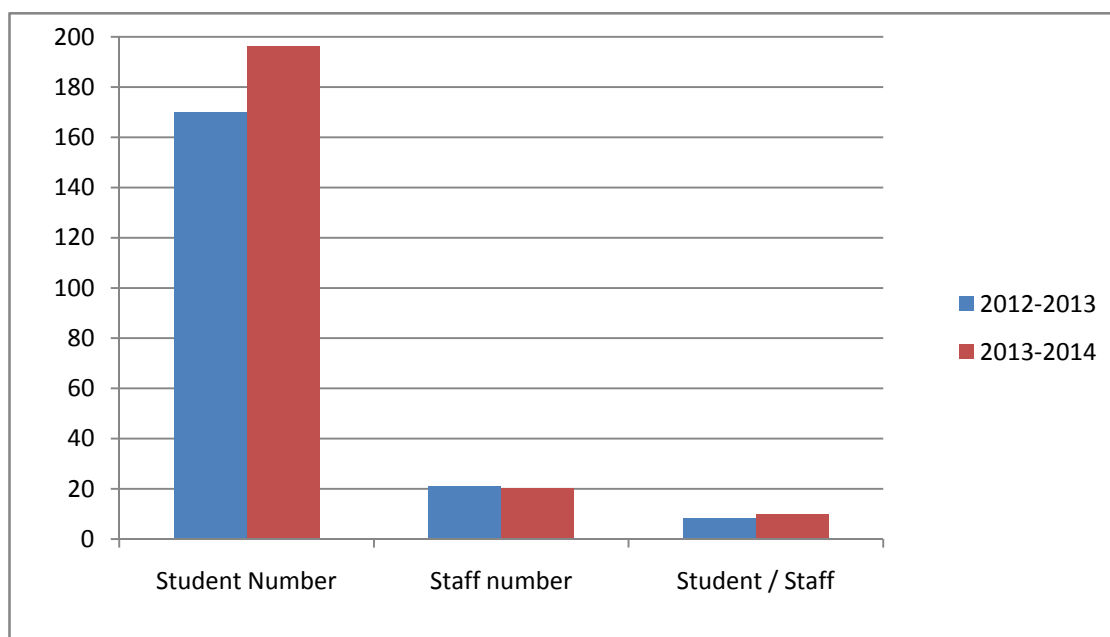


Figure 6-3 Student to Staff Ratio

6-7 External Assessor and External Assessment

At the end of the academic year, the performances of lecturers for subjects are evaluated. For this purpose an external assessor for each department is assigned considering following conditions:

- Assistant professor or more and preferred to be from international universities.
- Should be an active famous lecturer has experiences in his specialist or close to his specialist.
- Have not joined or shared in teaching or management of the course.

6-8 Roles of External Assessor

1. Evaluation of all program formatting and its content of the course (program year in our college),
2. Evaluation of examination process. Sample of answer papers of students is checked to see the scope of coverage of the material,
3. Reviewing the Course Book of subjects and checking the conducted (studied) materials,
4. Checking the feedbacks of students for subjects and lecturers,
5. Evaluating the existing facilities for submitting lectures,
6. Discussion with the head of department if required,
7. Discussion with the subject lecturer if required,
8. Writing the final report including evaluations of all above items.

6-9 External Assessments

After announcing the results of student, external examiners from different departments were called for assessment in July 2013. Each examiner contacted with the committee of quality assurance, examination committee, and head of department. Also they saw all facilities, then wrote their reports and generally have several comments. Some important of these are listed below:

1. Regarding Course Book: according to instructions, there should contain typical examples and solutions. Their evaluations were between Fair to Very Good.
2. According to last instructions of presidency, there was no any referring to check final examination answer books, while according to instructions these must be looked and checked.
3. It is better also to check the subject book and compared with the required syllabus.
4. Regarding the materials of subjects: in some class years, there are overlaps between two different subjects.
5. In some department classes, there are some materials that the student cannot realize, so it is better to transfer them to advanced classes.
6. The evaluations were concentrated on the course book, feedback of students, final exam questions and their typical solutions and facilitating for presenting lectures.
7. The range of overall evaluation levels for all items in above 7 was between fair and very good.

6-10 Activities of Presenting Seminars in the Departments and the College

Table 6-4 show the different activities in the department

Table 6-4 Seminars Activities

Nos. of Seminars presented in department (by Faculty Staff) 2011-2012	Nos. of Seminars presented in department (by Faculty Staff) 2012-2013
24	33

6-11 SWOT Analysis

S	STRENGTHS(Internal)	W	WEAKNESSES(Internal)
	<ul style="list-style-type: none"> ➤ Dedicated young staff. ➤ Presentation of obligatory seminars within the processes of applying continuous learning and quality assurance. ➤ The Department has a good relationship with students. ➤ Good social relationship among staff 		<ul style="list-style-type: none"> ➤ Increasing proportion of new faculty with inadequate teaching experience. ➤ Poor relationship with international research centers and academic institutions. ➤ Inadequate funding for research. ➤ Limited research experience. ➤ Inadequate funding for participation in international conferences and workshops.
O	OPPORTUNITIES(External)	T	THREATS(External)
	<ul style="list-style-type: none"> ➤ Available faculty development opportunities. ➤ Facilitate access to upgrading the degree M.Sc. ➤ New construction and technological advances. 		<ul style="list-style-type: none"> ➤ Low level of incoming students. ➤ Difficulty in participating of aboard conferences and trainings. ➤ Unavailability of visitor professionals (Teaching and/or instructors). ➤ Weaknesses in general level of scientific awareness of society.

CHAPTER SEVEN

SATFF AND FACILITES

7-1 Faculty Offices

The department has only one offices located in the camps of Erbil Technical Engineering College occupied by the faculty members and the head of the department. Due to insufficient office rooms some of the junior staff and teaching assistants occupy the available spaces in the laboratory.

7-2 Space of Department

The department is part of the Erbil technical engineering college. The department building consists of two floors that contain offices for the faculty members and the supporting staff together with classrooms.

1. Administrative office: the office of the Head of department is located on the Ground floor of the department building with approximately 33m², in area.
2. Administrative Supporting Staff; this consists of: -
 - One full time secretary whose job is to administratively assist the chairman; this office is 15 m², in area, and is directly connected to the chairman's office.
 - One head's assistant, who is a full-time faculty member whose job is to administratively assist the chairman. This office is 18 m², in area.
3. Faculty offices are allocated in three different space of the Department's Building. And total area of these offices is 86 m² in area.
4. Examination Committee Room: it is located at the ground floor near the administrative office with 16 m²,_in area.. It consists of two printing machine, one PC, and one photocopying/scanner machine.

7-3 Classrooms of the Department

There are five class rooms in the Refrigeration and Air conditioning engineering department. Students of the department. The rooms are equipped with two white boards for each class room as the main instruction tool.

Moreover. The rooms are equipped with data show facilities. The Department has only one common Drawing hall used and one computer hall. Table 7-1 shows the area and number of students per lecture hall.

Table 7-1 Details of the Department

Name of Hall	No. of hall	Area m²	Max. Number of seats
Lecture Room	5	70	63
Drawing Room	1	123	55
Computer Room	1	52	30

7-4 Laboratories and Workshop

The department contains two fully equipped laboratories for various disciplines. These two laboratories located on the ground floor of a building section. Total area of these laboratories is around 600 m². These laboratories are used for the planned experiments for the materials in the laboratory section in addition to the possibility of use by students of the projects. The laboratory is managed engineers and technicians working on the specialized high protection equipment in good condition. Table (7-2) shows names and areas of the laboratories. And table (7-3) gives the details of work shop

List of Laboratory of the Department

Table 7-2 Details of two laboratories

No	Lab. Name	Established	Area of Lab. (m ²)	Experimental Name	One group of Student
1	Computer Lab.	2013	52	<ul style="list-style-type: none"> • Windows • MS.Office • MS.Excel • MATLAB, • Fortran • AutoCAD 	28-32
2	Air Conditioning Lab.	2013	54	<ul style="list-style-type: none"> • Principle of Solar thermal energy • Wet cooling tower • Car Air Conditioning Trainer • Vapor compression refrigeration cycle • Building Automation in Heating and Air conditioning systems • Heat Exchanger with service unit • Absorption Refrigeration system 	10-15
3	Welding Lab	2012	36	<ul style="list-style-type: none"> • Straight line welding test. • Arc welding test. • V shape welding duct test. 	10-12

List of Workshops

Table 7-3 Workshops details

No	Workshop Name	Established	Area of Lab. (m ²)	Experimental Name	One group of Student
1	Air conditioning and refrigeration workshop	2012	132	<ul style="list-style-type: none"> • Introduction about refrigeration and Air condition • Tool materials and Welding • Split unit and Air conditioning • Refrigerator Mechanic cycle and Electric Cycle 	10-12
2	Sheet metal workshop	2012	25	<ul style="list-style-type: none"> • Straight and incline metal cutting • Box making (parallgram shape) • Box making (pyramids shape) • Duct making 	10-12
3	Welding workshop	2012	120	<ul style="list-style-type: none"> • Straight line welding • Zigzag line welding • Arcs zigzag line welding • Circle line welding 	10-12
4	Turnery workshop	2012	85	<ul style="list-style-type: none"> • Grinding and smoothing for a cylinder • Do one end of cylinder as a cone • Drill other end 	10-12

5	Carpentry workshop	2012	25	<ul style="list-style-type: none"> • Make a circle shape • Make a multiple shape • Make a sem-pyramids shape • Make a triangle shape 	10-12
6	Filings workshop	2012	35	<ul style="list-style-type: none"> • Preparing ,cutting and cleaning the sample • Angle selecting of cutting • Drilling to make a hole on the sample • Grinding and smoothing the sample 	10-12

7-5 Department Library

The Department has a library occupies one of the rooms of ground floor of department building. This library only contains the text books and helpful books of the settled curriculums. Every student has a right to allegory books property with his need in beginning year then recovers these books at the end of the year. The library has the following facilities:-

- ✚ Area of the library (15 m²)
- ✚ 580 Books
- ✚ 70 B.Sc. Graduation Projects

7-6 SWOT Analysis

S	STRENGTHS(Internal)	W	WEAKNESSES(Internal)
	<ul style="list-style-type: none"> ➤ New buildings and expansions and fully furnished. ➤ Adequate budget for purchasing textbooks and reference books. 		<ul style="list-style-type: none"> ➤ Insufficient number of lab halls. ➤ The department has no Internet connection. ➤ The department library has no subscribe to periodicals and scientific journals World.
O	OPPORTUNITIES(External)	T	THREATS(External)
	<ul style="list-style-type: none"> ➤ The presence of government financial support for official universities. ➤ Information based technologies. 		<ul style="list-style-type: none"> ➤ Admission of large number of transfer Students. ➤ Intense competition from new and private colleges of higher financial support compared to the old College of Engineering, which caused the low level of infrastructure compared to the modern college.

CHAPTER EIGHT

FINANCIAL SUPPORT

8-1 Program Budget Process

The department budget is part of the overall Erbil Technical Engineering College budget. The departmental budget is mainly dominated by the laboratory budget that is submitted separately per the process explained in the previous article. The department expenses (760,000,000 ID) Or (622,000 USD) include furniture, rehabilitations of university buildings, books, supplies. In addition to the approved laboratory budgets presented earlier.

8-2 Inadequacy of Budget

The AC Department has great shortage and inadequacy in budget to continue updating and enhancing the labs, to achieve its program's outcomes, and to support the faculty's teaching and scholarly activities.

8-3 SWOT Analysis

S	STRENGTHS(Internal)	W	WEAKNESSES(Internal)
	<ul style="list-style-type: none"> ➤ Adequate budget for purchasing textbooks, reference books and stationeries. ➤ Due to the process of assigning budgets to universities and colleges, the department receives a guaranteed annual budget. 		<ul style="list-style-type: none"> ➤ Complicated process of purchasing. ➤ No funds for starting scientific research. ➤ No funds for professional development. ➤ The department has no Independent external financial resources - a drawback which needs to be solved. ➤ Maintaining and upgrading facilities.
O	OPPORTINITIES(External)	T	THREATS(External)
	<ul style="list-style-type: none"> ➤ The presence of government financial support for official universities. ➤ Sending faculty and PhD students in scientific departments at various foreign universities research fellowship. 		<ul style="list-style-type: none"> ➤ Less development of the university, college, and the department.

CHAPTER NINE

SCIENTIFIC RESEARCH

9-1 Research Strategies

The Department has strategies in planning and carrying out scientific research. The faculty members individually plan their own researches to enhance and broaden their knowledge in the areas of their interest or specialization. The Unit of Scientific Affairs of the Erbil technical engineering college opened the M.Sc. in 2012-2013 no student is passed in the general examination.

9-2 Support of the Scientific Research

The Support of the Scientific Research program mission to disseminate the most modern science and engineering knowledge in the area of the Department can be achieved through the teaching process of the program's courses and publishing quality researches. The Department through its Dean and the Head of the Department encourages the staff members to conduct and publish their researches in local and international reputable scientific journals and take part in the national and international conferences and symposiums held in the Country and abroad.

9-3 International Publication Book, Paper and Conferences

The refrigeration and air conditioning engineering department staff has many international publications of book, conferences and paper as shown in the figure 9-1.

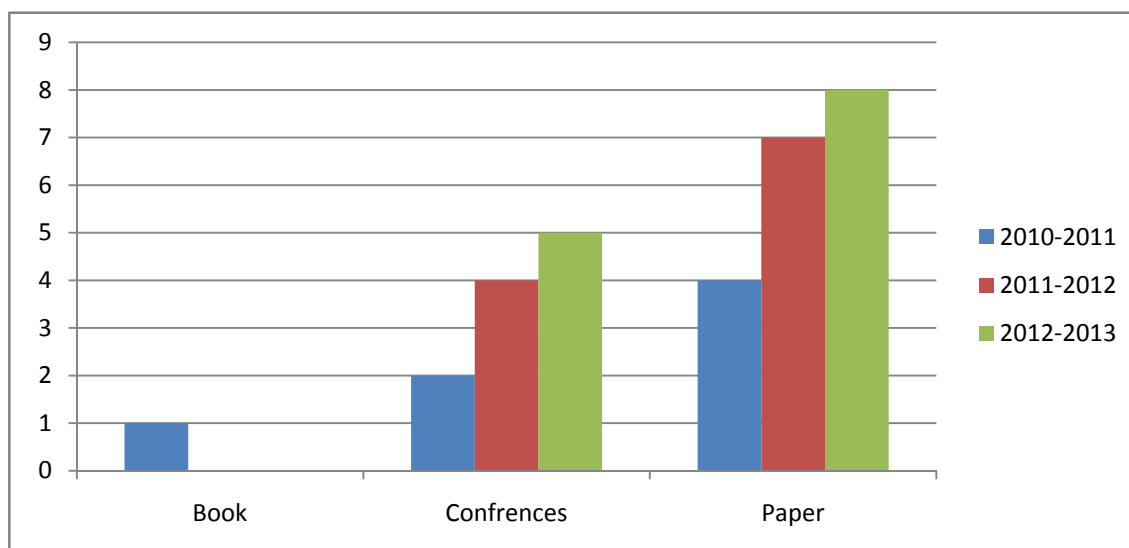


Figure 9-1 Details of publishing book, conferences and paper

9-4 SWOT Analysis

S	STRENGTHS(Internal)	W	WEAKNESSES(Internal)
	<ul style="list-style-type: none"> ➤ Opened postgraduate to get M.Sc. 		<ul style="list-style-type: none"> ➤ Less number of researches carried out by Faculty. ➤ Poor relationship with international research. ➤ Inadequate funding for research. ➤ The lack of a clear plan for scientific research reflect the requirements of the labor market
O	OPPORTINITIES(External)	T	THREATS(External)
	<ul style="list-style-type: none"> ➤ The appointment of the first three graduates. ➤ Building relationships with local company 		<ul style="list-style-type: none"> ➤ Reducing the budget and especially Paragraphs Concerning Dispatch and support research and publishing relating to the development of the research process.