ABET
Self-Study Report

For The

Air-Conditioning and Refrigeration Engineering Program

At

Mechanical Engineering Department
University of Technology
Baghdad, Iraq

July 2018

to

Engineering Accreditation Commission
ABET, Inc.
111 Market Place, Suite 1050
Baltimore, MD 21202-4012

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BACKGROUND INFORMATION

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B. Program History

About University of Technology:
The very early foundation of the university was in 1960 with the emergence of the High Industrial Institute, outlined by the Ministry of Education in cooperation with the United Nations Educational, Scientific and Cultural Organization (UNESCO). The founding of the Institute was declared on 22 January 1960. The objectives of the newly founded Institute were identified by the need for engineering technologists, to work in the industrial sector, with emphasis on engineering projects and applications research labs. Therefore, it was charged with the tasks of preparing teachers to train professionals in the Industrial and Professional trades and enabling specialists to manage departments and laboratories. When founded the Institute consisted the following departments:

- Department of Materials Engineering
- Department of Mechanical Engineering
- Department of Automotive Engineering
- Department of Electrical Engineering
- Department of Building and Construction Engineering
- Department of Manufacturing Engineering and Assembly

The name of the institute was changed, a few months after its inception, to the Higher Institute of Industrial Engineering, then subsequently renamed after an order by the Ministry of Higher Education, due to its increased importance and to reflect its advancement, and in agreement with UNESCO in 1967, to The Higher College of Industrial Engineering and subsequently amended to the college of Engineering Technology, while simultaneously annexed to the University of Baghdad, Final disengagement of the Faculty from the University of Baghdad, was issued by the decision
to establish the University of Technology on 1 April 1975, by a Presidential Decree. According to the system of the newly founded University of Technology, each department is equivalent to the deanery of a collage in other Iraqi universities in its administrative structure. The head of the department serves as Dean of the College and his assistants as dean ones and the heads of branches as the heads of departments in counterpart colleges.

About Mechanical Engineering Department
The Mechanical Engineering Department was founded with the emergence of the High Industrial Institute in 1960. The department is one of the oldest and the largest scientific departments of the University of Technology which aims primarily to prepare practical engineers in different fields of mechanical engineering at the stage of undergraduate studies and to build advanced cadres in different specifications in post-graduate studies for many graduates. The department undertakes the responsibility of contributing in the preparation of moderate cadres that are needed by development plans and developing studies in various and rare fields of mechanical engineering. It also contributes in the organizing of technical courses and works to improve all its technical, administrative and

teaching cadres, and rise their technical, administrative and teaching abilities and knowledge levels in sectors of mechanical engineering.
Within the process of Mechanical Engineering Department, the educational and scientific process began to develop through the accumulation of experiences taking advantage of the administrative and scientific competencies that gained many of its skills from previous generations, which were keen to the department academically and administratively. The study in the Department has the nature of application in addition to the theoretical lessons with higher engineering level where the department contains many specialized and acute laboratories; moreover the practical applications in the training center and laboratories at the University of Technology for the students of Mechanical Engineering Department continue during the various stages of the study and this is what qualifies the graduate to be good technological engineer. The summer training in government directorates and public sector organizations is a systematically considered lesson that many of engineering graduation projects for the final phase is characterized by technological nature. The department takes the initiative to send top students out of the country for research, training and access to the latest technological developments.

The department of Mechanical Engineering at the University of Technology (UOT) contains a number of laboratories and engineering workshops to help graduate students in primary and high studies to achieve the practical part of their studies .These laboratories have been developed and updated in recent years in line with the scientific and technological development. Currently, the department consists of five branches or programs, namely:

1- General Mechanical Engineering Branch.
2- Air-Conditioning and Refrigeration Engineering Branch.
3- Automotive Engineering Branch.
4- Aircraft Engineering Branch.
5- Power Plant Mechanics Engineering Branch.

The department gives bachelor's degree in the Engineering Sciences (B.Sc.) for five mechanical engineering specializations mentioned above and Master of Science degrees (M.Sc.) for specializations of Thermal Power, Applied Mechanics, Refrigeration and Air-Conditioning; as well as mechanical engineering Doctor of Philosophy (Ph.D.) degrees in both Thermal Power and Applied Mechanics.

About Air-Conditioning and Refrigeration Engineering Branch:
The Air-Conditioning and Refrigeration Engineering Program is an extension of the Mechanical Engineering Department. It was established in 1985.

C. Options

The ME program grants only one degree, the Bachelor of Science in Mechanical Engineering / Air-Conditioning and Refrigeration Engineering.

D. Organizational Structure

Administrative structure from lower to upper administration: Chair (Air-Conditioning and Refrigeration Engineering Program), Dean (Mechanical Engineering Department), Chancellor (University of Technology).

E. Program Delivery Modes

The program is comprised of on-campus, traditional lecture/laboratory courses. Almost all courses are delivered in the classroom or laboratory with the exception of two: (1) the Professional Experience course in which students are required to work during the summer of the second and third years at a company that offers professional engineering practice in their field of specialization. The work period covers a minimum of eight weeks of full-time work, and (2) the Project courses where students are required to work independently, under the supervision of a faculty member in the program, on a final year project in their field of specialization. In the webpage of the department, faculty members and students can find all courses contents available and free of charge services (downloads, review past exams….etc.). However, no distance education component is available in the program.

F. Program Locations

The program is completely offered in the main UOT campus in Baghdad.

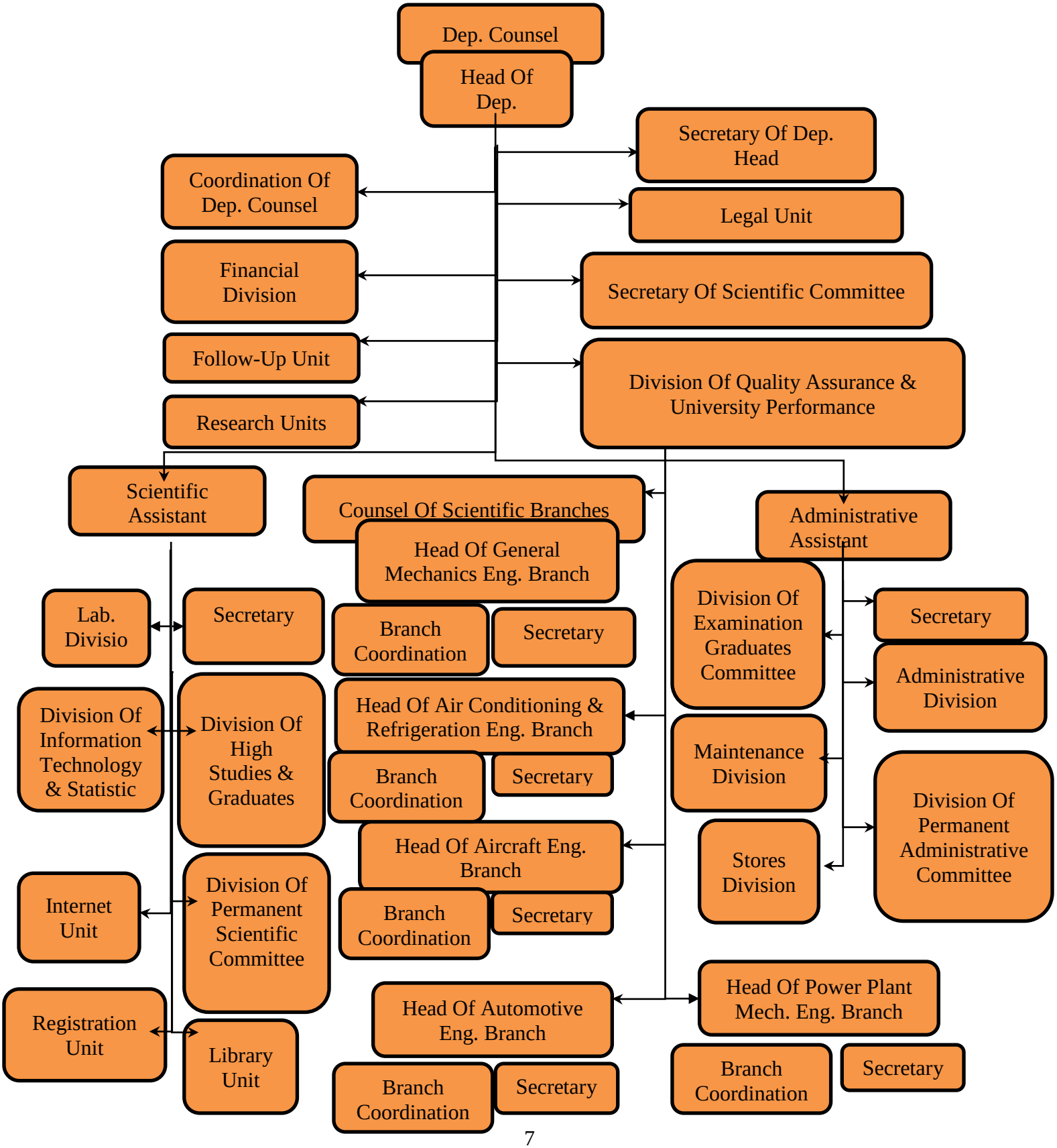
G. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Action Taken to Address Them

This will be the first evaluation by an ABET evaluation team.

H. Joint Accreditation

The program is jointly accredited by Mechanical Engineering criteria, but it is not seeking joint accreditation by more than one commission.

Organization Structure



GENERAL CRITERIA

CRITERION 1. STUDENTS

A. Student Admissions

1. To be accepted for an undergraduate degree in Mechanical Engineering/Air-Conditioning and Refrigeration, applicants must hold the official Iraqi Secondary School Certificate. The Ministry of higher Education and Scientific Research (MOHESR) controls and distributes electronically the admission of students in the governmental institutions and faculties according to their grades from the Secondary Schools as well as their applied list of selected studies, and institutes, prioritized according to the students own desire.

   Thus students are accepted and distributed at Engineering Departments in the University of Technology, including Mechanical Engineering Department, according to the capacity of the department and the average rates of the applicants and their desires. The acceptance plane is controlled by MOHESR. The department capacity plan in the past three years was (150) students. New students admitted in the Mechanical Engineering Department- University of Technology should meet the minimum extent of the following requirements:
   a. To be of Iraqi nationality and has been born in 1997 or later.
   b. Having a certificate from an Iraqi secondary school authorized from the Ministry of Education.
   c. Non-Iraqi students (arrivals) who obtained a certificate of an Iraqi secondary school admitted according to the centralized admission system conducted by MOHESR.
   d. A candidate graduated from a high school outside of Iraq has to be had completed twelve years of study (primary and secondary) from an accredited school. He or she also has to provide a certificate accreditation from the Iraqi Ministry of Education.
   e. Having a medical certificate to ensure that he or she is qualified.
   f. To commit to a full-time study.
   g. Not to be enrolled in another collage at the time of his or her study in this department.
   h. Admission of the top 10% of the Technical Institutes' graduates.
   i. Acceptance of talented student.
   j. Candidates must submit the required documents within a specified period.

2. After students or applicants are admitted in UOT / in the appropriate department according to their grades, the department will also distribute and register them into the scientific branches of department with priority according to:
   - Student's grades.
   - Student's list of choices representing his/her desire to register in each branch.

3. The above mentioned sequence is documented and must be followed by written rules in which a special committee is formed and consists of some experienced academic staff with head of registration division in the department to perform the admission and distribution of new students in the appropriate branches.

For more information visit link http://www.moher.edu.iq/

Table (1.1) Numbers and rates of enrolled students for the last five years.

Academic year	Admission grades		No. of new students	No. of graduates
	Minimum average	Moderate average		
2017-2018			42	36
2016-2017	86.28	93.00	39	34
2015-2016	89.57	90.00	40	35
2014-2015	89.00	91.00	56	47
2013-2014	86.71	87.92	59	47

B. Evaluating Student Performance

The Evaluation process and assessment measures are as follows:

Subject with lab.	First term10% + 5% continuous evaluation	Second term 10% + 5% continuous evaluation	10% lab. evaluation	Final Exam 60%	Final Grade 100%
Subject without lab.	First term10% + 5% continuous evaluation	Second term 10% + 5% continuous evaluation	N/A	Final Exam 70%	Final Grade 100%
Engineering Drawing & Descriptive Geometry	Mid term20%	30% Continuous evaluation	N/A	Final Exam 50%	Final Grade 100%
Programming, CAD, CAE	First term10%	Second term10%	30% lab. evaluation	Final Exam 50%	Final Grade 100%
Design	First term10% + 15% continuous evaluation	Second term 10% + 15% continuous evaluation	N/A	Final Exam 50%	Final Grade 100%
Project	First term 20%	Second term30%	N/A	Final Discussion 30% +20% Thesis	Final Grade 100%

The commitment of the students related to attending school halls also being pursued (through the Committee of absences) on a regular basis and followed-up curriculum and study vocabularies and their absorption truly to prevent repeated absences so as not to exceed the allowable specified percentage (10% of the total number of hours during the year) .

Students who were not able to attend the relevant final examination or fulfill some of the course requirements because of conditions beyond their control are allowed to take a second attempt exam. Also Students who were not able to attend the relevant second attempt examination because of conditions beyond their control (due to security and violence issues) are allowed to take a third attempt exam (this issue is to be declare only by the Ministry of Higher Education & Scientific Research). If the student fails to get 50% as a final grade after the third attempt he/she will be considered as (FAIL) in that module/course. The student is allowed to carry two failed modules/courses to the next level or academic year, but if he/she fails in more than two modules/courses, the student has to repeat the academic year. If the student fails to succeed two successive years, he/she will be dismissed and the general registration office of the university will close his/her file as student.

C. Transfer Students and Transfer Courses

An applicant who has studied at a recognized institution of higher education may apply for admission as a transfer student. A transfer applicant will not be considered for admission if he or she is on academic probation, suspension, or dismissal from the previous institution. The conditions to approve a transfer students' admission are the followings:

1. The Chancellor of the university has the authority to transfer students (either those who pass or not pass the final exams) , except for the first and last year students , to the corresponding departments and branches in another university according to the absorptive capacity after obtaining clearance from the original and new university .
2. Students who pass final exams have the right to move to the corresponding colleges, departments, and branches in universities at their geographic regions according to the absorptive capacity after obtaining no objection from the original and new university.
3. Movement between colleges at the same governorate is not allowed.
4. Conduct scientific clearing in according to the applicable roles.
5. The departments of UOT represent colleges, and the transfer between them is central and according to an electronic form.
6. Sons of scientific titles of the faculty have the right to move between the branches of the colleges and/or departments.
7. Students in community (private) colleges who pass the final exams ranking first, and obtain at least a grade of (very good), have the right to move to the corresponding dept. in the public universities.
8. Acceptance of foreign students (Iraqi and non-Iraqi nationality) from outside Iraq must be conducted according to the Ministry of Higher Education and Scientific Research rules.

For more information visit link http://www.moher.edu.iq/

D. Advising and Career Guidance

Committee of Educational Guidance: - tasks of this committee represent the following points:

1. A meeting of mentors and faculty members assigned to the guidance on how to provide a safe environment for students, and contribute to modify their behavior.
2. Hold a seminar for junior students to familiarize them with the functions of the educational guidance and how to deal with the problems they may face and be educated on how to deal with members of the faculty and the style of problem-solving manner correctly.
3. Develop educational and professional releases that contribute to the benefit of students in the school and the various aspects of life.
4. Held several meetings for mentors for students in second, third, and fourth academic year, Respectively, to discuss various educational and behavioral aspects of interest to students.
5. Participate in field trips for students in the department to the relevant authorities that serve practical student.

E. Work in Lieu of Courses

N/A

F. Graduation Requirements

To obtain degree of Bachelor of Science in Mechanical Engineering/Air-Conditioning and Refrigeration program, the student must adhere to the following requirements:

1. Succeeding in the four academic years of study where the maximum period allowed for the study is six years (according to year of acceptance, effective regulations and instructions related to student)
2. Passing the summer training successfully.
3. Success and acceptance of the graduation project.
4. The graduation requirements are completed, when students have successfully earned a total of 3570 credit hours.

Academic year		Subjects no.	Units no.	No. of hours/week			
				Theoretical	Exp.	Tutorial	Total
First		10	33	14	13	3	30
second	A/C & Ref. Eng.	9	42	17	8	4	29
Third	A/C & Ref. Eng.	9	42	17	8	5	30
Fourth	A/C & Ref. Eng.	9	42	15	12	3	30

For postgraduate studies the minimum period of study for the degree of master's is two calendar years after the B.Sc. including the completion of 36 units, and number of hours of first year courses is 360 hours. Then the student must pass the final defense of his/her thesis.

G. Transcripts of Recent Graduates

Transcripts of recent graduates will be provided to Team Chair when requested.

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

Mission Statement of the University of Technology
Graduate numbers of applied engineers and scientific research cadre with efficient and unique level of knowledge and technological innovation to achieve quality assurance and academic accreditation in accordance with the discreet standards universally adopted in engineering and scientific curriculum with a commitment to engineering and scientific ethics.

Mission Statement of the Mechanical Engineering Department
The mission statement of the Mechanical Engineering Department (including the Air-Conditioning and Refrigeration Branch) is:

1. Prepare engineers with bachelor's degree in mechanical engineering sciences according to society's need and keeping up with technical and scientific advances through upgrading teaching staff, laboratories, libraries and curriculum.
2. Developing higher education courses quantitatively and qualitatively in accordance with the mission of the University of Technology.

http://www.uotechnology.edu.iq/dep-MechanicsandEquipment/english/index.htm

B. Program Educational Objectives

The Air-Conditioning and Refrigeration engineering program have strategic objectives which are represented by:

1. Preparing engineers in mechanical engineering / Air-Conditioning and Refrigeration, able to develop their skills in the fields of engineering knowledge.
2. Focusing on introducing modern methods in the learning system that increase the students' ability to design, creativity and innovation.
3. Paying more attention to students in various aspects, able to engage in life-long learning to advance professionally through continuing education and training.

http://www.uotechnology.edu.iq/dep-MechanicsandEquipment/english/index.htm

C. Consistency of the Program Educational Objectives with the Mission of the Institution

The mission of the Mechanical Engineering Department (Air-Conditioning and Refrigeration Engineering Program) is consistent with the mission of the University of Technology. The Mechanical Engineering Department mission highlights two primary goals of preparing mechanical engineers and developing the engineering education process which are also

addressed in the university mission.

The first component states that “Prepare engineers who had bachelor's degree in mechanical engineering sciences according to society's need and keep going with technical and scientific, through upgrading teaching staff, laboratories, libraries and curriculum”. The University’s mission underscores this idea in the statements such as “Graduate numbers of applied engineers and scientific research cadre with efficient and unique level of knowledge and technological innovation”.

The second component states that “Developing higher education courses and modules quantitatively and qualitatively in accordance with the mission of the University of Technology”. The University’s mission underscores this idea in the statements such as “to achieve quality assurance and academic accreditation in accordance with the discreet standards universally adopted in engineering and scientific curriculum with a commitment to engineering and scientific ethics”.

The primary goal of the MED. (Air-Conditioning and Refrigeration Engineering Program) is to prepare the students for successful careers in the air-conditioning and refrigeration engineering profession and subsequently they will contribute to the society and advance professionally. Therefore, the Program Educational Objectives are consistent with the mission of the University as well as the MED.

D. Program Constituencies

The main constituencies of the Air-Conditioning and Refrigeration Engineering program are:

- Students
- Faculty
- Staff
- Alumni
- Employers
- Program Advisory Board

The constituencies and their relationships to the program are described below:

1) **Students:**
   Students have a clear interest in having a broad knowledge of the program related principles, tools, and theories as this prepares them for related careers, and helps them secure jobs locally and abroad. The importance of student engagement is reiterated in student forums discussions, the course surveys and the alumni surveys.

2) **Branch members:**
   Branch members strive toward graduating students who are technically capable; have an understanding of the ethical and social dimensions in the program; capable of life-long learning, and who can work in teams. Such traits would elevate the program status and improve its reputation locally, regionally, and internationally. The Branch works with

course coordinators in order to review courses and ensure that they are aligned with the program outcomes, which in turn contribute to the program's objectives.

3) Staff members:

The program receives support at the Branch, Departmental and University levels. The personnel provide administrative and technical support. Their tasks include overseeing the up keeping of department, academic, financial, and documents, arranging and sending calls on behalf of the chair for departmental meetings, data collection process for evaluation activities. They also maintain updated student records, personnel, alumni data, and work closely with the Registrar's office to coordinate all program related matters, as well as administering training/internship opportunities for the potential students.

4) Alumni:

Alumni are clearly influenced by the branch reputation, as this would help them advance their careers. They frequently contact faculty for recruitment purposes. Finally, the branch regularly surveys alumni in order to confirm that the objectives are in line with current trends.

5) Employers:

Employers or industry partners have indicated that they have a clear interest in having students prepared upon entering the workforce. Clearly, the technical and personal preparation of the students is instrumental. Employers are also surveyed to get their feedback and ideas on the state of our graduates and the relevancy of the program's outcomes and objectives.

6) Program Advisory Board:

The Mechanical Engineering Department (MED) has an Industrial Advisory Council (IAC), which is currently composed of 18 academic and industry leaders from various sectors in the field of Engineering, meets once or twice a year and have played an important role on curriculum changes and continuous improvement of the ME Program based on the current and future needs of industry. The fall meeting features an Undergraduate Forum, where the council members address and discuss important engineering issues with the students. At the spring meeting the primary role of the council is to evaluate and critique the Capstone Design Presentations. The Council is an objective body within Mechanical Engineering Department that ensures the department's continuous commitment to anticipate and surpass new academic challenges set forth by an evolving industry. The board experts are:

No.	Job Title	Full Name	Workplace	Scientific Branch
1	Senior Chief Engineer	Majed Nader Abed Alkader	Ministry of Electricity - General Directorate for Electro Power Production - Central Region	General Mechanical
2	Senior Engineer	Emad Khanim Nagi	Ministry of Oil - Oil Pipeline Company - Al- Karkh Warehouse	General Mechanical

3	Engineer	Nader Rasheed Saaid	Commercial Director of Al-Tamimi Engineering Group - Private sector	General Mechanical
4	Professor Dr.	Qasim Salih Mahdi	College of Engineering – University of Al-Mstansirya	Airconditioning and Refrigeration
5	Lecturer / Engineer	Abed Alkarim Salman AbedAlkarim	Universal Al-Esrah College	Airconditioning and Refrigeration
6	Engineer	Ali Zuhir Ali	Hexa Corp Carrier Company	Airconditioning and Refrigeration
7	Engineer	Basim Mahdi Jaffer	Iraqi Airways	Aircrafts
	Engineer	Raaid Salman Aliwi	Iraqi Airways	Aircrafts
9	Engineer	Ihsan Ezet Salih	Iraqi Airways	Aircrafts
10	Military Dean Engineer	Sabah Adem Mahmoud	Air Force Leadership - Director of Air Engineering	Aircrafts
11	Dr. Engineer	Raouf Mohamed Radie Almosawi	General Company for Automotive and Equipment Manufacturing - Alexandria	Automotive
12	Engineer	Adnan Ahmed Razin	General Director of the General Company for Automotive and Equipment Manufacturing - Alexandria	Automotive
13	Engineer	Hassan Saad Abu Naylah	Veritas Limited Company for Automotive Trading and Services - Agent of Doudg, Jeep and Chrysler Company in Iraq	Automotive
14	Chief Engineer	Dr. Raad Abed Mahdi	Ministry of Electricity - Planning and Studies Department	Power Plants
15	Chief Engineer	Lamaan Sabri Majly	Directorate of Electricity Production - Central Region	Power Plants
16	Chief Engineer	Alaa Abed Aljebar Bedin	Ministry of Electricity - Training and Energy Researches Department	Power Plants
17	Consultant Engineer	Adel Bader Alryahi	Ministry of Planning – Bureau of Ministry Deputy	Power Plants
18	Engineer	Mazin Khadim Mohamed	Al-Kudis Thermal Generating Station	Power Plants

E. Process for Review of the Program Educational Objectives

- The Program Educational Objectives (PEOs) are reviewed and updated by the following steps:

1. The PEOs are reviewed and revised as necessary by the General Assembly meeting by MED Council at the beginning of every academic year.
2. The PEOs are reviewed by the MED Industrial Advisory Council at their fall meeting (every year).
3. The PEOs are reviewed by students and alumni for their input (every fourth year).
4. The MED scientific committee analyze the constituent feedback and assessment results during summer, and then recommend specific changes on the PEOs, if necessary, to the MED council (every year).
5. Back to the step 1 for an annual review process.

The PEOs are fully reviewed and evaluated on a four-year cycle. Our current students are also involved in the review, since the PEOs should meet their goals and needs after graduation.

The PEOs have been reviewed according to the review process as described earlier, and approved by the MED council in September 2017, where the educational objectives of the undergraduate program of MED- ACRE has been changed to the following:

1. Preparing engineers in mechanical engineering / Air-Conditioning and Refrigeration, able to develop their skills in the fields of engineering knowledge.
2. Focusing on introducing modern methods in the learning system that increase the students' ability to design, creativity and innovation.
3. Paying more attention to students in various aspects, able to engage in life-long learning to advance professionally through continuing education and training.

CRITERION 3. STUDENT OUTCOMES

A. Student Outcomes

Students from the Mechanical Engineering/ Air-Conditioning and Refrigeration program will attain (by the time of graduation):

a. The ability to apply knowledge of engineering, science and mathematics.
b. The ability to design and conduct experiments, as well as analyze and interpret data.
c. The ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political and ethical, as well as health and safety, manufacturability, and sustainability.
d. The ability to work in multi-disciplinary teams.
e. The ability to identify, formulates, and solve engineering problems.
f. An understanding of professional and ethical responsibility.
g. The ability to communicate effectively in oral and written forms.
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 in Air-Conditioning and Refrigeration.
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

It is noted that the initial Student Outcomes of the Air-Conditioning and Refrigeration Engineering (ACRE) program began with the same set of the ABET Criterion 3 Student Outcomes (a) through (k). It has been carefully reviewed whether the Student Outcomes are properly linked to our Program Educational Objectives and also whether our students would be well prepared to achieve the Program Educational Objectives in future practice, if they attain the Student Outcomes by the time of graduation. Through the ongoing review and assessment process, no need for additional outcomes has been identified.

B. *Relationship of Student Outcomes to Program Educational Objectives*

The linkage between the individual *Program Educational Objective* (PEOs) and the *Student Outcomes* (SOs) is shown below in Table 3-1 and their relationships are briefly described as follows:

The educational objectives of the undergraduate program in MED-ACRE program are to produce graduates who (during the first several years following graduation) are:

1. Able to apply the scientific knowledge and methods in thinking and analysis to solve engineering problems associated with the design, operation and maintenance of air conditioning and refrigeration systems.
2. Able to utilize modern methods in engineering knowledge and skills to make positive impact on society and profession.

3. Able to engage in life-long learning to advance professionally continuing education and training .

PEO #1 Achievement of the Student Outcomes a, b, c, e, f, h, j, and k ensures that our graduates are adequately equipped with the suitable level of knowledge and skills required solve engineering problems associated with the design, operation and maintenance of air conditioning and refrigeration systems

PEO #2 Achievement of the Student Outcomes c, d, f, g, h, j, and k ensures that our graduates are adequately utilize modern methods in engineering knowledge and skills to make positive impact on society and profession.

PEO #3 Achievement of the Student Outcomes d, g, and i will ensure the required ability to engage in life-long learning to advance professionally continuing education and training.

To ensure that our graduates have achieved the Student Outcomes, the curriculum must contribute for achievement of each Student Outcome collectively. The syllabi for the required course are contained in the **Appendix A**.

Table (3-1) Mapping of Program Educational Objectives to Student Outcomes.

Student Outcomes (SOs)	PEOs		
	PEO #1	PEO #2	PEO #3
a	×		
b	×		
c	×	×	
d		×	×
e	×		
f	×	×	
g		×	×
h	×	×	
i			×
j	×	×	
k	×	×	

CRITERION 4. CONTINUOUS IMPROVEMENT

The assessment and evaluation process of the Air-Conditioning and Refrigeration Engineering (ACRE) program consists of two separate systems; one for the Program Educational Objectives (PEOs) and the other for Student Outcomes (SOs). The assessment and evaluation results are used for continuous improvement of the ACRE curriculum and also used to revise and update the PEOs and SOs as needed. It is noted that the ACRE faculty and Industrial Advisory Council (IAC) play an important role in the annual review and assessment process.

A. Program Educational Objectives

The process for reviewing relevancy of the PEOs is described in Criterion 2.

In May 2018, the PEOs were reviewed by the students and alumni, through the surveys. The student surveys were conducted in two classes (4^{th} class A and 4^{th} class B A/C branch) and the survey question asked students whether the PEOs satisfy their goals and needs after graduation. More than 90% of the students answered "Yes" for the survey question. Samples of alumni who graduated between 2006 and 2018 were also asked whether the PEOs met their goals and needs after graduation and an 80% of the alumni who replied the survey answered "Yes" for the survey question. The survey results with the average scores (Rating: 1= strongly disagree, 2= disagree, 3= neutral, 4=agree, 5=strongly agree) for each PEO are shown in Figures 4.1 and 4.2.

The survey results were discussed at the ACRE faculty meetings during the May 2018. It was noted that the top two suggestions from our alumni for improvement of our program were "more real world experience" and "better communication skills". The faculty members will ask to consider more real world problems in their teaching materials in annual meeting September 2018. The PEOs were also reviewed by the MED-IAC during their fall June 2018 meeting and no revision was suggested.

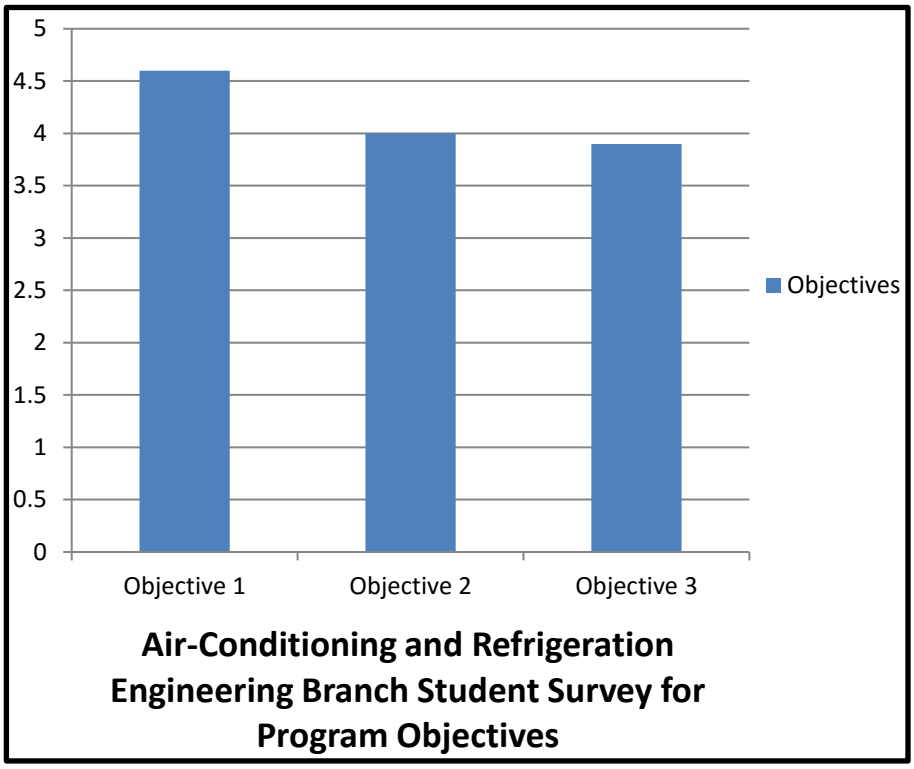


Fig. 4.1 student survey for program Objectives

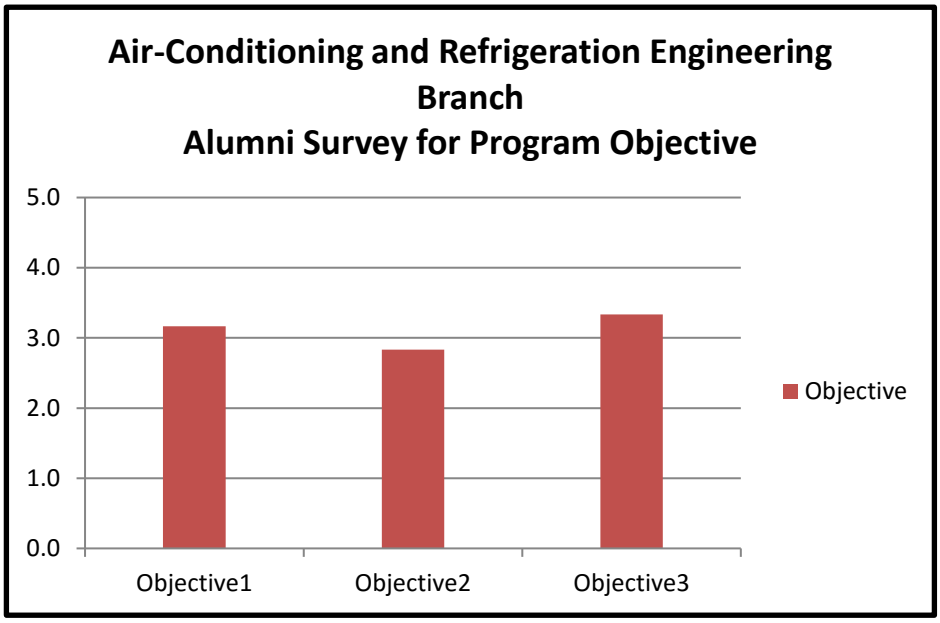


Fig. 4.2 alumni survey for program objective

B. Student Outcomes

B.1. Assessment and Evaluation Process of the Student Outcomes

The assessment methods for the Student Outcomes (SOs) include Course Assessment and SOs surveys at the Exit Interview. The assessment data collected during each academic year are analyzed during the following summer. The assessment results and actions for improvement are discussed at the beginning of the annually faculty meeting in September. The ACRE ABET Coordinator oversees all the assessment process while the ACRE Undergraduate Committee discuss the assessment results and recommend the possible actions for improvement to the ACRE faculty. The two assessment methods for the assessment and evaluation of Student Outcomes (SOs) are briefly described below.

B.2. Course Assessment

The SOs are assessed through the assessment of the outcome-related from various courses collectively. Our primary goal is to distribute the coverage of each SO throughout the program so that our curriculum could provide repeated practice and feedback in the knowledge and skills the students need to achieve. To assure that our graduates have achieved the SOs, the curriculum must contribute for achievement of each SO collectively. As all the SOs are addressed within the core ACRE courses, our students will be trained to achieve the SOs. In our system, the students have two attempts, one in June and the second in September. If they fail in first attempt, they have the right to have second attempt. Student work samples were collected as a part of the course assessment and they will be available for review.

B.3. Student Outcome Survey at Exit Interview

The Final year students meet with the Department Chair and Dean at May. As a part of the exit interview, the student surveys were conducted in two classes (4th class A and 4th class B A/C branch) and the survey question asked students whether the SOs satisfy their goals and needs after graduation. More than 90% of the students answered "Yes" for the survey question based on the education and training they received through the ACRE undergraduate program. Figure 4.3 shows the results of the survey with the average scores (Rating: 1= strongly disagree, 2= disagree, 3= neutral, 4=agree, 5=strongly agree) for each Student Outcome for 2017-2018.

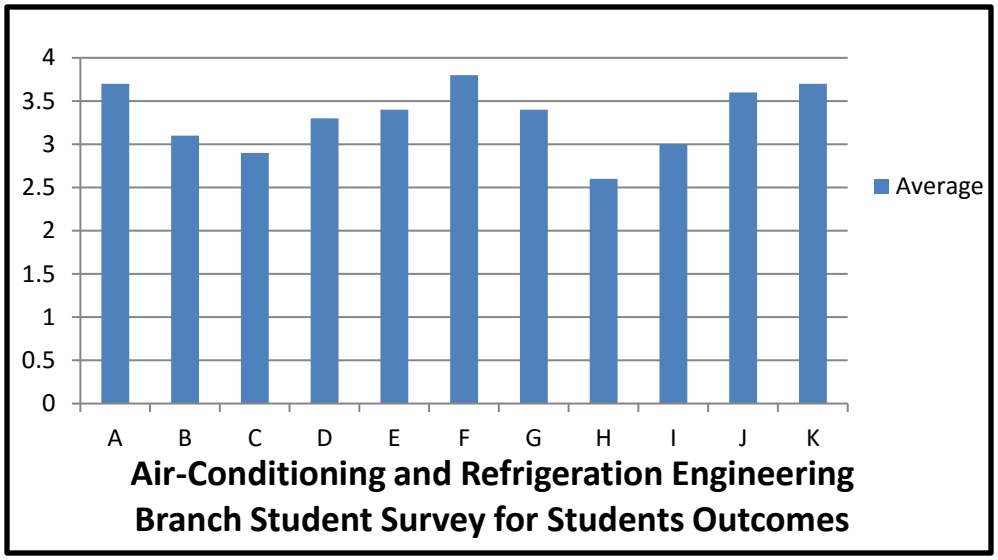


Fig. 4.3 Exit interview survey for student outcomes

B.4. Alumni Survey

The Alumni meet with the Department Chair and Dean at May 2018. A survey is conducted for the assessment of Student Outcomes. The alumni were also asked whether the SOs met their goals and needs after graduation and an 80% of the alumni who replied the survey answered "Yes" for the survey question (Figure 4-4).

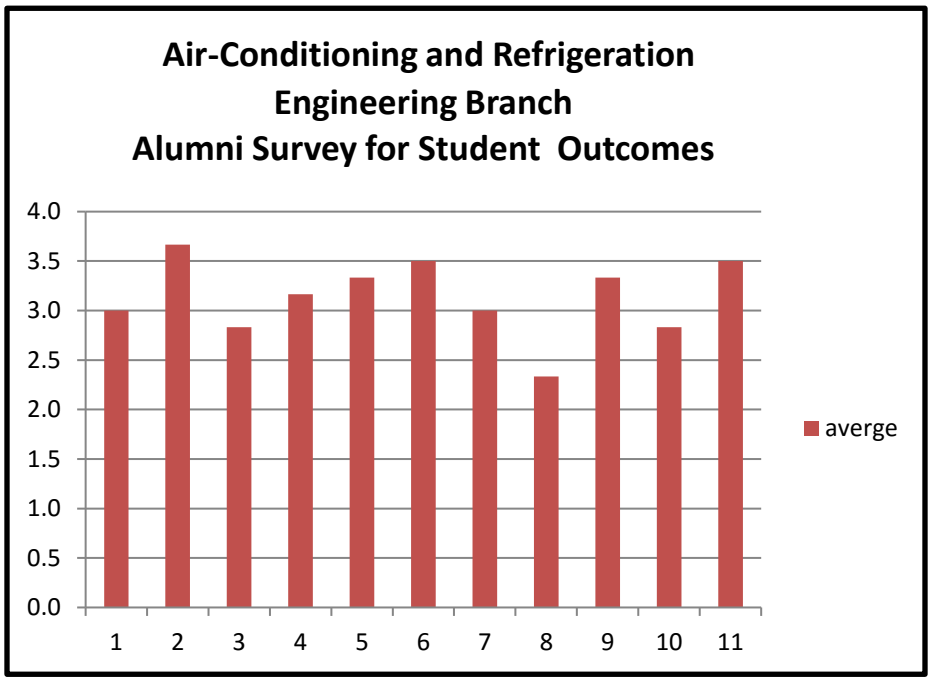


Fig. 4.4 Alumni survey for student outcomes

C. Continuous Improvement

C.1. Program Improvement by Assessment of Program Educational Objectives

To measure the level of achievement of the Program Educational Objectives (PEOs) by our graduates, the feedbacks from the alumni and employers of our graduates are utilized through the surveys. Both of the alumni survey and the employer survey were conducted in May at end of 2017-2018. The results showed that our graduates in average have achieved the PEOs and our graduates were comparable to the engineers from other schools as described in the previous section. The survey results were discussed at the ACRE faculty meetings and no particular action was taken for improvement of our program at this time. We have also received many comments and suggestions from our alumni and employers. At this time, the feedbacks on the two of most common subjects such as "more real world experience" and "better communication skills" were further discussed at the faculty meeting. Even though no particular action was taken for improvement of our program, it

was suggested that the faculty should try to use more practical class examples and problems closely related to real world and to include more writing assignments and chance of oral presentation in each course schedule.

C.2. Program Improvement by Assessment of Student Outcomes

To measure the level of achievement of the Student Outcomes (SOs) by our students before their graduation, two assessment methods are being utilized including Course Assessment and SOs survey (Exit Interview survey) as described in the previous section. The assessment data are collected during the 2015-2016 and 2016-2017 for courses assessment and 2016-2017 for survey. The data will analyze by the ACRE ABET coordinator during summer. Then, the assessment results are reviewed by the ACRE Undergraduate Committee to recommend possible actions for improvement to the ACRE faculty.

CRITERION 5. CURRICULUM

A. Program Curriculum

A.1. Table 5-1 Curriculum

Table 5-1 describes the plan of study for students in the Air-Conditioning and Refrigeration program including information on the maximum section enrollments for all courses in the program for the last two terms the course was taught. Table 5-1 is attached at the end of this section (Criterion 5. Curriculum).

A.2. Relation with Program Educational Objectives

The educational objectives of the undergraduate program in Air-Conditioning and Refrigeration Engineering are to produce graduates who (within a few years of graduation):

1. Able to apply the scientific knowledge and methods in thinking and analysis to solve engineering problems associated with the design, operation and maintenance of air conditioning and refrigeration systems.
2. Able to utilize modern methods in engineering knowledge and skills to make positive impact on society and profession.
3. Able to engage in life-long learning to advance professionally continuing education and training.

There are three major components of the program curriculum: (1) foundation in the mathematical and basic sciences, (2) engineering topics in mechanical systems with design applications, and (3) general education in the computer programming eng. drawing, materials, and humanities courses. The program components are carefully selected and designed to meet the PEOs, as will be described in section A.5.

A.3. Relation with Student Outcomes

Students from the ACRE program will attain (by the time of graduation):

a. An ability to apply knowledge of engineering, science, and mathematics (including multivariate calculus and differential equations);
b. An ability to design and conduct experiments, as well as to analyze and interpret data;
c. An ability to design systems, components, or processes to meet desired needs within realistic constraints;
d. An ability to function on multi-disciplinary teams;
e. An ability to identify, formulate, and solve energy and renewable energies engineering problems;
f. An understanding of professional and ethical responsibility;
g. An ability to communicate effectively in oral and written forms;
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 in energy and renewable energies engineering;
k. An ability to use the techniques, skills, and modern engineering tools necessary for

engineering practice.

To assure that our graduates have achieved the Student Outcomes (SOs), the curriculum must contribute for achievement of each Student Outcome collectively. As all the Student Outcomes are addressed within the core curriculum, students of the Air-Conditioning and Refrigeration Engineering Program will be trained to achieve the Student Outcomes throughout the coursework. Table 5-2 describe how the curriculum and its associated prerequisite structure support the attainment of the student outcomes. This Table is attached at the end of this section (Criterion 5. Curriculum).

A.4. Prerequisite Flow Chart

A flow chart showing the prerequisite structure of the ACRE curriculum is attached after the Tables at the end of this section (Criterion 5. Curriculum).

A.5. Major Components of the Program

The Air-Conditioning and Refrigeration Engineering program produces graduates who are prepared to enter the practice of air-conditioning and refrigeration engineering. There are three major components of the program: (1) foundation in the mathematical and basic sciences, (2) engineering topics in mechanical systems with design applications, and (3) general education in the computer programming eng. drawing, materials, and humanities courses.

A.5.1. Mathematics and Basic Sciences

The engineering science fundamentals and engineering design skills are built upon the basic mathematics and basic sciences. The mathematics work begins with a two-course sequence (ME/321, ME/322) on differential and integral calculus.

ME/123 include engineering and numerical analysis with particular applications in numerical differentiation and integration.

ME/541 Workshop Training; Preparation of engineering cadres trained scientific and practical areas in the electricity, automobiles, machining (lathe, milling, drilling), forging, denting, filings, forging, welding, and casting.

ME/731 and ME/732 Engineering Mechanics, These courses aim to provide theoretical knowledge and principles of statics and Dynamics.

ME/931 aim to provide theoretical knowledge and principles of the electrical engineering

ME/823 and ME/924 aims to provide theoretical and practical knowledge in computer aided design and computer aided engineering tools.

A.5.2. Engineering Topics

The aim of the program is to graduate students capable to work as mechanical engineer in air-conditioning and refrigeration field. The engineering topics are include the following courses:

ME/631 and ME/632 Thermodynamics, aims to provide theoretical Fundamentals of thermodynamic concepts.

ME/152 Mechanical & Electrical systems, aim provides the basic of mechanical and electrical systems.

ME/432 Mechanical Drawing, aims to provide the rules of mechanical drawing.

ME/542 Strength of Materials, aims to provide theoretical Fundamentals of the strength of

materials.

ME/832 Manufacturing Processes, aims to provide the fundamentals of manufacturing processes.

ME/942 and ME/663 Fluid Mechanics, It provides a working knowledge of Fluid Mechanics.

ME/243 Theory of Machines, illustration and discussion the main application of theory of machine that occur in mechanical engineering field.

ME/343 Mechanical Eng. Design, aims to provide the working knowledge of the design of mechanical engineering systems.

ME/463 and ME/464 Equipment Technology, Illustration and discussion the principles of operation for air-conditioning and refrigeration systems including the internal combustion engines.

ME/543 Heat Transfer, aims to provide theoretical basics of the conduction, convection and radiation heat transfer.

ME/763, ME/364 and ME/664 aim to provide the theory, application and design of air-conditioning and refrigeration systems.

ME/913 Industrial Engineering, determine the most effective ways for an organization to use the basic factors of production.

ME/134 Measurements, aims to provide the working principles of measurements tools and systems.

ME/234 Automatic Control, aims to provide the main theoretical principles of control systems.

ME/564 Mechanical Vibration, illustration and discussion the principles of free & forced vibrations.

ME/764 Energy Conservation, illustration and discussion the suitable methods for energy conservation.

A.5.3. General Education

To satisfy the general education requirements the air-conditioning and refrigeration engineering program set required courses in the general education component as follows:

ME/111 Human Rights and Democracy, The course covers the concept of human rights, freedom and democracy.

ME/221 and ME/222 Programming, aim to provide the principles of computer programming languages.

ME/431 Eng. Drawing and Descriptive geometry, aims to provide the theory, principles and practice of eng. drawing and descriptive geometry.

ME/831 Properties of Materials, illustration and discussion the properties of engineering materials.

A summary of the credit hours for the educational program and the distribution of the curriculum topics is given in Table 5-3 attached at the end of this section (Criterion 5. Curriculum).

A.6. Graduation Project

One of the graduation requirements is that the student should achieve the last stage for graduation project (ME/844). These graduation projects are being distributed at the beginning

of the academic year by the disciplines according to the rates of students. The graduation project should be completed by student and in case of non-completion he will not meet graduation requirements.

A.7. Cooperative Education

The requirements for obtaining a bachelor's degree in mechanical engineering is that the students should complete sixty days of the summer training in the common sector or the public sector and this training is a mandatory element of the graduation requirements, and be under the supervision of the summer training commission in the departments.

A.8. Teaching Materials and Student Work Samples

For the required courses only, teaching materials (textbook, the regular course syllabus, course outlines, and list of assignments, etc.), and student work samples of all the assignments (homework, quizzes, exams, lab reports, and design projects, etc.) will be available for review at the time of visit.

B. Course Syllabi

The syllabus for the required courses are contained in the **Appendix A**.

Table 5-1: Curriculum

Mechanical Engineering Department - Air-Conditioning and Refrigeration Program

Course (Air-Conditioning and Refrigeration Program)	Course is Required, Elective, or a Selective Elective (R,E or SE)	*Curricular Area (Credit Hours)*				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Average Section Enrollment for the Last Two Terms the Course was Offered
		Math & Basic Sciences	Eng. Topics	General Education	Other		
	First Year						
ME/111 Human Rights & Democracy	**R**			**2**		2017-2018	***42***
ME/221 Programming I	**R**			**2**		2017-2018	***42***
ME/321 Mathematics I	**R**	**3**				2017-2018	***42***
ME/431 Engineering Drawing &Descriptive Engineering	**R**			**4**		2017-2018	***42***
ME/541 Workshops	**R**	**6**				2017-2018	***42***
ME/631 Thermodynamics I	**R**		**4**			2017-2018	***42***
ME/731 Mechanics I	**R**	**4**				2017-2018	***42***
ME/831 Properties of Material	**R**			**2**		2017-2018	***42***
ME/931 Electrical Engineering	**R**	**3**				2017-2018	***42***
	Second Year						
ME/152 Mechanical & Electronic Systems	**R**		**2**			2017-2018	***36***
ME/222 Programming II	**R**			**2**		2017-2018	***36***
ME/322 Mathematics II	**R**	**3**				2017-2018	***36***
ME/432 Mechanical Drawing	**R**		**3**			2017-2018	***36***
ME/542 Strength of Materials	**R**		**4**			2017-2018	***36***
ME/632 Thermodynamics II	**R**		**4**			2017-2018	***36***

ME/732 Mechanics II	**R**	**3**				2017-2018	***36***
ME/832 Manufacturing Processes	**R**		**4**			2017-2018	***36***
ME/942 Fluid Mechanics I	**R**		**4**			2017-2018	***36***
	Third Year						
ME/123 Engineering & Numerical Analysis	**R**	**3**				2017-2018	***30***
ME/243 Theory of Machines	**R**		**4**			2017-2018	***30***
ME/343 Mech. Eng. Design I	**R**		**4**			2017-2018	***30***
ME/463 Equipment Technology I	**R**		**3**			2017-2018	***30***
ME/543 Heat Transfer	**R**		**4**			2017-2018	***30***
ME/663 Fluid Mechanics II	**R**		**4**			2017-2018	***30***
ME/763 Air-Conditioning & Refrigeration	**R**		**4**			2017-2018	***30***
ME/823 Computer Aided Design	**R**	**2**				2017-2018	***30***
ME/913 Industrial Engineering	**R**			**2**		2017-2018	***30***
	Fourth Year						
ME/134 Measurements	**R**		**2**			2017-2018	***36***
ME/234 Automatic Control	**R**		**3**			2017-2018	***36***
ME/364 Design of Air- Conditioning systems	**R**		**4**			2017-2018	***36***
ME/464 Equipment Technology II	**R**		**5**			2017-2018	***36***
ME/564 Mechanical Vibration	**R**		**4**			2017-2018	***36***
ME/664 Refrigeration	**R**		**4**			2017-2018	***36***
ME/764 Energy Conservation	**R**		**3**			2017-2018	***36***
ME/844 Project	**R**		**3**			2017-2018	***36***
ME/924 Computer Aided Eng.	**R**	**2**				2017-2018	***36***
OVERALL TOTAL CREDIT HOURS FOR THE DEGREE		***119 hours per a week***				***3570 hours for B.sc.***	
PERCENT OF TOTAL		*25%*	*65%*	*10%*	*0%*		

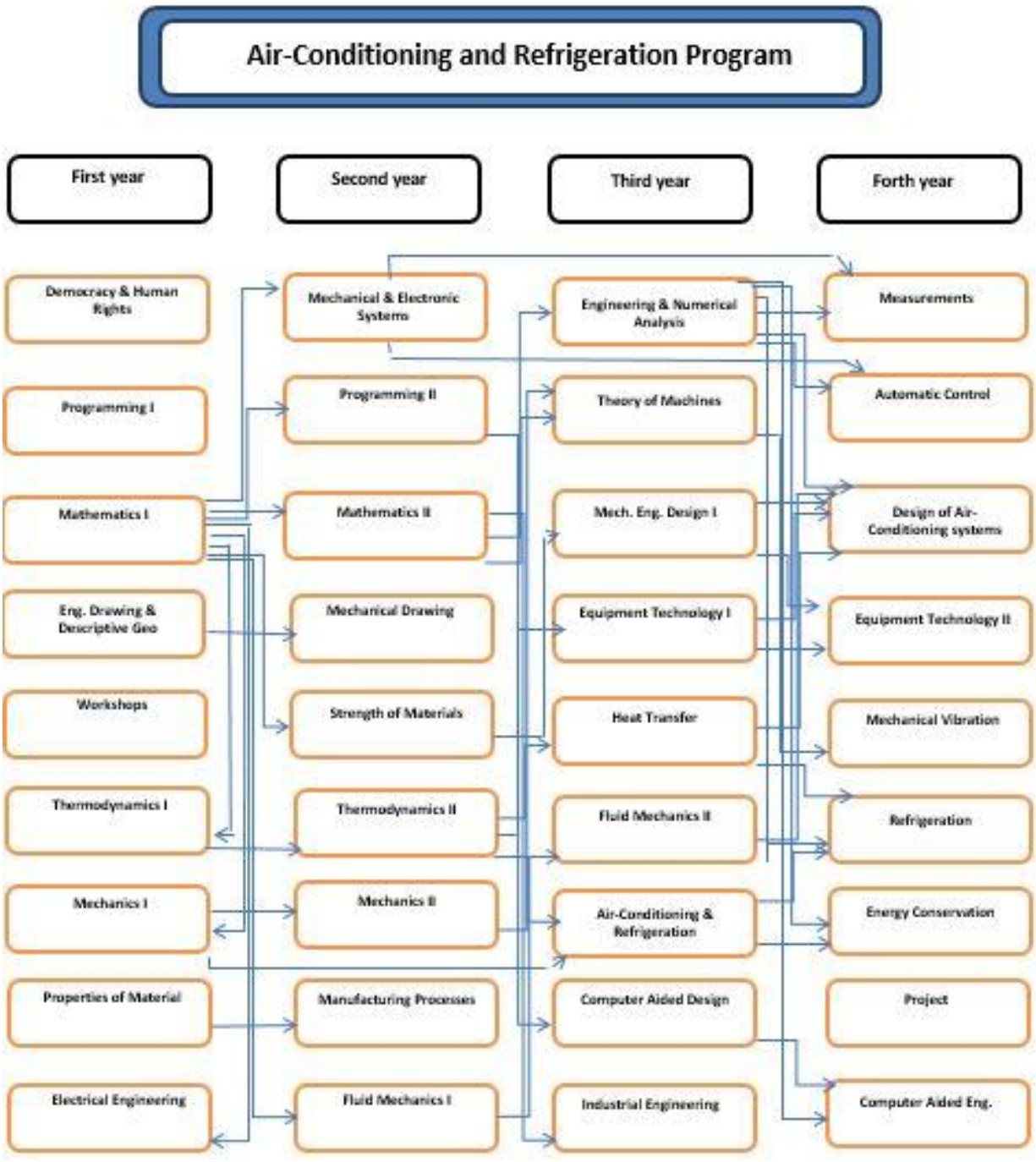
Table 5-2: Relationship of Courses in the Curriculum and its associated prerequisite to the SOs for Air-Conditioning and Refrigeration Program

Curriculum			Student Outcomes (SOs)										
Code	Name	Prerequisite(s)	a	b	c	d	e	f	g	h	i	j	k
First Year													
ME/111	Human Rights & Democracy							•			•		
ME/221	Programming I		•				•				•		•
ME/321	Mathematics I		•				•				•		
ME/431	Eng. Drawing &Descriptive				•						•		•
ME/541	Workshops				•	•		•			•		•
ME/631	Thermodynamics I	ME321	•	•			•				•		
ME/731	Mechanics I	ME321	•	•			•				•		
ME/831	Properties of Material				•		•				•		
ME/931	Electrical Engineering	ME321	•	•			•				•		•
Second Year													
ME/152	Mechanical & Electronic Sys.	ME321	•						•		•		•
ME/222	Programming II	ME221	•				•				•		•
ME/322	Mathematics II	ME321	•				•				•		
ME/432	Mechanical Drawing	ME431			•						•		•
ME/542	Strength of Materials	ME321	•	•	•						•		
ME/632	Thermodynamics II	ME321,ME631	•	•			•				•		
ME/732	Mechanics II	ME321,ME731	•	•							•		
ME/832	Manufacturing Processes	ME831		•			•	•			•	•	•
ME/942	Fluid Mechanics I	ME321	•	•			•				•		
Third Year													
ME/123	Engineering & Numerical Analysis	ME322	•	•			•				•		•
ME/243	Theory of Machines	ME322,ME732	•	•			•				•		
ME/343	Mech. Eng. Design I	ME322,ME542, ME432	•		•	•	•	•			•		•
ME/463	Equipment Technology I	ME322,ME632	•	•			•				•		•
ME/543	Heat Transfer	ME322,ME632	•	•			•				•		
ME/663	Fluid Mechanics II	ME942,ME322	•	•			•				•		
ME/763	Air-Conditioning & Refrigeration	ME731, ME632	•	•	•		•			•	•		•
ME/823	Computer Aided	ME222,ME322	•		•	•	•		•		•		•

	Design												
ME/913	Industrial Engineering	ME322					•	•	•		•	•	•
Fourth Year													
ME/134	Measurements	ME152,ME123	•		•		•		•		•		•
ME/234	Automatic Control	ME152,ME123	•	•			•				•		
ME/364	Design of Air-Conditioning systems	ME543,ME463, ME343,ME663, ME123	•	•	•	•	•	•		•	•		•
ME/464	Equipment Technology II	ME463,ME343, ME123	•	•			•				•		•
ME/564	Mechanical Vibration	ME243,ME123	•	•			•				•		
ME/664	Refrigeration	ME543,ME763, ME123	•	•	•		•				•		
ME/764	Energy Conservation	ME763,ME123	•	•	•		•			•	•		•
ME/844	Project		•	•		•	•	•	•		•		•
ME/924	Computer Aided Eng.	ME 823,ME 123	•		•	•	•		•		•		•

Table 5-3: Summary of the credit hours for the educational program and the distribution of the curriculum topics

Number of hours	Branch		
119	Air-Conditioning and Refrigeration		
Curriculum			
Topics	Hours	percentage	Branch
Mathematics & Basic Sciences	29	25%	A/C & Ref. Eng.
Engineering Topics	78	65%	A/C & Ref. Eng.
General Education	12	10%	A/C & Ref. Eng.


Air-Conditioning and Refrigeration Program
First year
Second year
Third year
Forth year
Democracy & Human Rights
Programming I
Mathematics I
Eng. Drawing & Descriptive Geo
Workshops
Thermodynamics I
Mechanics I
Properties of Material
Electrical Engineering
Mechanical & Electronic Systems
Programming II
Mathematics II
Mechanical Drawing
Strength of Materials
Thermodynamics II
Mechanics II
Manufacturing Processes
Fluid Mechanics I
Engineering & Numerical Analysis
Theory of Machines
Mech. Eng. Design I
Equipment Technology I
Heat Transfer
Fluid Mechanics II
Air-Conditioning & Refrigeration
Computer Aided Design
Industrial Engineering
Measurements
Automatic Control
Design of Air-Conditioning systems
Equipment Technology II
Mechanical Vibration
Refrigeration
Energy Conservation
Project
Computer Aided Eng.

CRITERION 6. FACULTY

A. Faculty Size

The size of faculty in the Air-Conditioning and Refrigeration program is 21 instructors. While the number of faculty members in the department of mechanical engineering for the academic year 2017-2018 is 109 instructors. It is enough to cover the required courses, and also to perform other tasks related to program evaluation and continuous improvement. The mechanical engineering department faculty is composed of 57.8 % of doctorate degree holders and 42.2% of master's degree holders. According to gender , the faculty members of the males is 78 % and females is 22 % , and according to scientific degree , 6.42 % professors , 27.52% assistant professors, 33.95 % teachers , and 32.11% a assistant teachers.

The faculty is branching into interdisciplinary and several areas of technology in mechanical engineering can be classified into three major specialties: Thermal Power, Applied Mechanics, and Production Engineering. Number of faculty members in each discipline allows the department to provide all required in the field of primary educational program in mechanical engineering during a year.

The table below shows the faculty members and classifies them according to their specialties. (It should be noted here that there are a number of faculty members are enrolled in graduate studies for a doctorate inside and outside Iraq).

The number of faculty according to their classifications and specializations for 2017-2018.(Mechanical Engineering Department)

Specialization	Certificate		Scientific title				Gender		Total
	Ph.D.	MSc	Professor	Assistant Professor	teacher	assistant teacher	Male	Female	
Thermal Power	41	33	5	18	26	25	57	17	74
Applied Mechanics	18	12	1	9	10	10	24	6	30
Production Engineering	2	-	-	2	-	-	2	-	2
Other	2	1	1	1	1	-	2	1	3
Total	63	46	7	30	37	35	85	24	109

Department of mechanical engineering has capability and strong ability of education as well as a strong commitment in the field of university education because of its own expertise accumulated over years. Ratio of students to faculty is almost 8:1 (Teachers holders of PhD), 12:1 (for holders of Master), and 5:1 (for all teachers), which is close to the average in the University of Technology. Thus, the faculty in the department able to provide a program that is enough to interact with students.

B. Faculty Qualifications

Table 6-1 contains the faculty qualifications summary. Table 6-1 is attached at the end of this section (Criterion 6. Faculty).

C. Professional Development

Activities of faculty members for development and professionalism include : attending seminars and lectures , participating in training workshops, professional conferences , professional writing Activities , review activities ,producing new and innovative research, and training programs inside and outside Iraq , including:

- Study leave (outside country) is a program that allows faculty members who did not get a Ph.D. to get a chance to study abroad. The ministry provides tuition fees, travel, and a monthly stipend. It also includes participations through temporary contracts with the same benefits. Many professors participated in this program successfully.
- Continuing Education Center offers professional development courses and training for faculty members. It is requested from all new faculty members to obtain a certificate of participation for training in the first year of work.
- Sabbatical leave: the university supports professional faculty members for work (full-time) after five years of service. Some faculty members have benefited from this opportunity.
- Training teaching staffs outside Iraq world prestigious universities according to the program of the Directorate of Research and Development at the Ministry of Higher Education and Scientific Research.

The Faculty Vitae are contained in the **Appendix B**

D. Faculty Workload

Table 6-2 contains the Faculty Workload Summary. Table 6-2 is attached at the end of this section (Criterion 6. Faculty).

Teaching Load

Department of mechanical Engineering gives priority in the appointment of faculty members to the doctoral graduates of world prestigious universities. Number of faculty members had been changed over the past ten years (depending on the circumstances of the country). Load of teaching is being distributed according to the scientific rank of faculty members, and as follows: 6 credit hours maximum for Professor 8 credit hours maximum for Assistant Professor 10 credit hours maximum for a teacher, and 12 credit hours maximum for an assistant teacher. Any additional load for faculty member is being compensated financially.

E. Authority and Responsibility of Faculty

Interaction with Students

The ministry and University of Technology affirm to improve the quality of teaching through interaction with students by activating the open-door policy, a commitment to the number of weekly work hours, and supervision on the design for specialized project teams stages as well as graduation projects, which require holding regular weekly meetings with the students.

Also some faculty members have consulting in the professional associations that require attending regular meetings, providing advice to the leaders of the student, and traveling with the students for the purpose of supervising the research or participating in regional and national conferences and competitions.

Interaction with Government and Labor Market

University of Technology has contributed over many years to provide services for many different government ministries and private sector. These services cover a variety of activities including engineering consultancy, conducting a preliminary and final designs, verification of designs, oversee the implementation of projects, organizing courses, developmental courses for continuing education, research and evaluation of patents, contracts research for the graduate students with government ministries, and other activities.

Educational Guidance (Student)

Students are being dealt and provided with advice and guidance by the Student Affairs Committee in the Department of Mechanical Engineering. This committee is composed of some faculty members and is responsible for advising students and helping them in their professional development.

Several meetings are held with members of the faculty and with the students outside the lecture times to look at the scientific affairs and university research activities. Advice is being provided for students by all members of the faculty on the basis of experience, guidance and voluntarily.

Power and Responsibility

The dean of the University gives power to head Assistant of the department and heads of branches on the recommendation of the department head, and they continue their work for four years, moreover; at the end of the four years, his functions can be extended or instruct another member of the faculty members to take his place. The administrative assistant of department head gives power to members and coordinators of various committees, as well as distributes administrative tasks. Scientific Assistant of department head manages and coordinates all terms concerning scientific committees, management plan and the scientific curriculum of the department. Head of department heads meetings of the Board department (which consists of administrative and scientific Assistants, heads of branches and representative of the teachers' union) and he also represents department in the meetings of the Council of University of Technology , The head of the department has the responsibly of scientific , administrative and financial authority .

Responsibility of faculty is full-time work according to the law of the university service and that is included teaching, research, institutional services, committees and professional

community services. In addition to the possibility of initiating a faculty member in updating curriculum under the supervision of the Scientific Committee and put it through the meetings of department in the General Assembly. A proposal is being offered to the Scientific Committee in the University of Technology concerning amending the curriculum for final approval.

Table 6-1. Faculty Qualifications

Name of Program: Air-Conditioning and Refrigeration Engineering

Faculty Name	Highest Degree Earned- Field and Year	Rank [1]	Type of Academic Appointment[2] T, TT, NTT	FT or PT[3]	Years of Experience			Professional Registration/ Certification	Level of Activity[4] H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Abdulhassan A. Karamallah	**PhD., Power**	**P**	**T**	**FT**	**46**	**32**	**15**		**H**	**H**	**M**
Wahid S. Mohammad	**PhD.,Power**	**P**	**T**	**FT**	**43**	**30**	**15**		**H**	**H**	**M**
Mohammed I. Mohsin	**PhD.,Power**	**AST**	**T**	**FT**	**36**	**21**	**15**		**H**	**H**	**M**
Ahmed Abed Mohmed	**PhD.,Power**	**AST**	**T**	**FT**	**30**	**14**	**14**		**H**	**H**	**M**
Zainab H. Hassan	**PhD.,Power**	**AST**	**T**	**FT**	**Govt.**	**15**	**15**		**H**	**H**	**M**
Nabil Noor Swadi	**PhD.,App. Mech.**	**AST**	**T**	**FT**	**36**	**15**	**15**		**H**	**H**	**M**
Hasanen M. Hussen	**PhD.,Power**	**I**	**T**	**FT**	**31**	**20**	**15**		**H**	**H**	**M**
Louay A. Mahdi	**PhD.,Power**	**I**	**T**	**FT**	**22**	**22**	**22**		**H**	**H**	**M**
Ali Lafta	**PhD.,Power**	**I**	**T**	**FT**	**17**	**17**	**17**		**H**	**H**	**M**
Nabeel S. Mahmoud	**PhD.,Power**	**I**	**T**	**FT**	**12**	**12**	**12**		**H**	**H**	**M**
wafa abd Soud	**PhD.,App.Mech**	**AST**	**T**	**FT**	**28**	**28**	**28**		**H**	**H**	**M**
Suhad A. Rashed	**PhD.,Power**	**I**	**T**	**FT**	**25**	**25**	**25**		**H**	**H**	**M**
Mohammed F. Mohammed	**PhD.,Power**	**I**	**T**	**FT**	**21**	**10**	**15**		**H**	**H**	**M**
Ammar S. Hamid	**PhD.,Power**	**I**	**T**	**FT**					**H**	**H**	**M**
Enass H. Flaieh	**PhD.,Power**	**I**	**T**	**FT**	**12**	**12**	**12**		**H**	**H**	**M**

Mustafa Abdulhussain	**MSc.,App. Mech.**	**A**	**T**	**FT**	**12**	**12**	**12**		**H**	**H**	**M**
Emad E. Habib	**MSc.,Power**	**A**	**T**	**FT**	**45**	**14**	**9**		**H**	**H**	**M**
Ali A. Humadi	**MSc.,App.Mech.**	**A**	**T**	**FT**			**15**		**H**	**H**	**M**
Sabah Tarik Ahmad	**PhD.,Power**	**P**	**T**	**FT**	**40**	**38**	**36**		**H**	**H**	**M**
Hassan M. Alwan	**MSc.,App. Mech.**	**AST**	**T**	**FT**					**H**	**H**	**M**
Ahmed A. A. Jabbar	**PhD.,Power**	**I**	**T**	**FT**	**12**	**12**	**12**		**H**	**H**	**M**

Instructions: Complete table for each member of the faculty in the program. Add additional rows or use additional sheets if necessary. Updated information is to be provided at the time of the visit.

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other
2. Code: TT = Tenure Track T = Tenured NTT = Non Tenure Track
3. At the institution
4. The level of activity, high, medium or low, should reflect an average over the year prior to the visit plus the two previous years.

Table 6-2. Faculty Workload Summary
Name of Program: Air-Conditioning and Refrigeration Engineering

Faculty Member (name)	PT or FT[1]	Classes Taught (Course No./Credit Hrs.) Term and Year[2] 2016/2017	Program Activity Distribution[3]			% of Time Devoted to the Program[5]
			Teaching	Research or Scholarship	Other[4]	
Abdulhassan A. Karamallah	**FT**	**ME463/3 hrs**	**40%**	**40%**	**20%**	**80%**
Wahid S. Mohammad	**FT**	**ME763/4 hrs**	**40%**	**40%**	**20%**	**80%**
Mohammed I. Mohsin	**FT**	**ME663/4 hrs**	**40%**	**40%**	**20%**	**80%**
Ahmed Abed Mohmed	**FT**	**ME664/4 hrs**	**40%**	**40%**	**20%**	**80%**
Zainab H. Hassan	**FT**	**ME632/4 hrs**	**40%**	**40%**	**20%**	**80%**
Nabeel Noor Swadi	**FT**	**ME243/4 hrs**	**40%**	**40%**	**20%**	**80%**
Hasanen M. Hussen	**FT**	**ME364/4 hrs**	**40%**	**40%**	**20%**	**80%**
Louay A. Mahdi	**FT**	**ME464/5 hrs**	**40%**	**40%**	**20%**	**80%**
Ali Lafta	**FT**	**ME942/4 hrs**	**40%**	**40%**	**20%**	**80%**
Nabeel S. Mahmoud	**FT**	**ME134/2 hrs**	**40%**	**40%**	**20%**	**80%**
wafa abd Soud	**FT**	**ME564/4 hrs**	**40%**	**40%**	**20%**	**80%**
Suhad A. Rashed	**FT**	**ME543/4 hrs**	**40%**	**40%**	**20%**	**80%**
Mohammed F. Mohammed	**FT**	**ME123/3 hrs**	**40%**	**40%**	**20%**	**80%**
Ammar S. Hamid	**FT**	**ME732/3 hrs**	**40%**	**40%**	**20%**	**80%**
Enass H. Flaieh	**FT**	**ME222/2 hrs**	**40%**	**40%**	**20%**	**80%**
Mustafa Abdulhussain	**FT**	**ME823/2 hrs**	**40%**	**40%**	**20%**	**80%**
Emad E. Habib	**FT**	**ME364/2 hrs**	**40%**	**40%**	**20%**	**80%**
Ali A. Humadi	**FT**	**ME432/3 hrs**	**40%**	**40%**	**20%**	**80%**
Sabah Tarik Ahmad	**FT**	**ME764/3 hrs**	**40%**	**40%**	**20%**	**80%**
Hassan M. Alwan	**FT**	**ME542/4 hrs**	**40%**	**40%**	**20%**	**80%**
Ahmed A. Abdul Jabbar	**FT**	**ME152/2 hrs**	**40%**	**40%**	**20%**	**80%**

1. FT = Full Time Faculty or PT = Part Time Faculty, at the institution
2. For the academic year for which the Self-Study Report is being prepared.
3. Program activity distribution should be in percent of effort in the program and should total 100%.
4. Indicate sabbatical leave, etc., under "Other."
5. Out of the total time employed at the institution.

CRITERION 7. FACILITIES[1]

A. *Offices, Classrooms and Laboratories*

Buildings

Mechanical engineering department has two buildings because it is one of the largest engineering departments at the University of Technology and they are:

• Building (M) (Main): It is the headquarter of the main department.

• Building (B) (Branch): It is attached to the department building.

Each building contains three floors and a basement that includes the faculty offices, classroom, laboratories and the headquarters of the committees, units and branches receptions civil defense officers and stores, while the offices of the heads of branches, a library of Graduate Studies, the Internet unit and free books store and ateliers are being distributed on two buildings except the presidency of the department located in the main building. Each branch of the five ones of engineering specialties contained in the engineering department includes coordinators, secretarial and some of faculty members

The department provides stationery with its supplies and cleaning materials for all laboratories, ateliers and headquarters. There are also a sports arena with an area of 1000 m^2, and a (50) m^2 hall for various activities.

Offices

Faculty offices are located in two buildings (M and B) and each room occupied by teaching one teacher and in some cases (2-3) teachers , so the office spaces are ranging between (20-10) m^2, and these rooms are well furnished carpeted, air-conditioned and equipped with Internet service. In addition to the fact that all teaching staff are provided with a laptop computer.

Classrooms

Classrooms are divided into two buildings M and B, including large and small ones, which all have (146) (WIGHT BOARD) and (4) (SMART BOARDS): There are two types of these smart boards:

• Ebeem board with a contact pen.

• Ketab board; this kind of blackboards is very sensitive that should not be writing on or strep. It has a sensor pen biasing charger.

It should be noted that all classrooms are air-conditioned, including the Hall of Graduate Studies and the halls of conferences and seminars, and the latter two also contain integrated and different display devices and their accessories and laptop computer equipped with Internet service.

Ateliers: There are two Ateliers (1 and 2) which are furnished appropriately and enough for students and note that the AutoCAD substance was added to the ateliers along with engineering and mechanical drawing.

(Table 7.1) shows the name of classroom with its space, its capacity and the actual occupancy.

[1]Include information concerning facilities at all sites where program courses are delivered.

Laboratories

There is in the Mechanical Engineering Department about (26) Laboratories and two workshops distributed in two buildings M and B. Table (7-2) shows Labs names, their areas, instruments numbers, and the subjects it serves and the required instruments. The lab is being supervised by a faculty member who undertakes the theoretical side while the practical side is under the responsibility of lab engineer but under the supervision of the teacher. The policy in the laboratory imposes the presence of CYCLE for each stage divided the number of students on the basis of (A, B, and C) aggregates, each group enters given lab in a week and is given the theoretical part of the experience, and most of which is complementary to the theoretical lectures in the stage curriculum and specialization in which the student then has made the practical part, taken readings and performed calculations with a model of the solution and draw diagrams and discussed them. The number of given tests for each lab rang from (4-7) experiments during the academic year and (8-12) exercises for programming and computers laboratories. There is a comprehensive examination on all tests and exercises at the end of the academic year and the degree of the laboratory is the rate of total degrees of reporting and discussing all experiments.

There is also models in some laboratories that increase the knowledge of students, for example: (cross-sections for some parts of the engines). Laboratory devices are maintained by the maintenance unit of the department and there are new devices added to the preliminary and graded studies laboratories during the past three years. It should be noted also that there is guidance stated that graduation projects and graduate studies should have carried ideas for devices to be used in laboratories and testing. There are cultural relations with other Iraqi universities, whether governmental or civil or institutions of higher education and scientific research to give assistance to their students and researchers in using these laboratories. Modern lab devices have been bought for the different department disciplines and is being planned to buy more during the coming years until renovating all laboratories with academic apparatus similar to those in the world universities.

Also the committees, divisions, units and some laboratories are provided with a computer desktop or laptop.

B. Computing Resources

The general computer labs are located on the 1st floor of Mechanical Engineering Department main building, next to the halls study area. There are 40 seats, available to all ME students both graduate and undergraduate, on a first come basis. The lab is proctored and open hours from 8:00 AM to 2 PM. A High Performance Computing (HPC) facility provides remote access to high level programming. The computer labs are primarily used by ME undergraduates students, but is also available to ME graduate. Also, these labs used for teaching the undergraduate students courses such as Computer Graphics, Computer languages. There are wide range of engineering software is available on all of these computing platforms. The software types include Solid Works, AutoCAD, graphics simulation and analysis software (FEM, FEA, and CFD), materials databases, and mathematical modeling and programming software (Matlab, Labview, etc.).

C. Guidance

Internet Unit

At the University of Technology, there is a Center of Information and Communications Technology which provides all its scientific departments and research centers with internet service (WIRELSS NETWORK) by distributor (ROUTERS). Buildings stories and the offices of the teaching staff are supplied with lines, where there is one system in the department which includes (96) lines .

There are (204) desktop computers, (115) laptops, (107) of which are for faculty as well as there are (91) desktop computers, (15) laptops used for administrative and service purposes– administrators, technicians , scattered (2) Laptops, (204) office Computers (41) Computers added this year , as well as (113) desktop computers dedicated for programming laboratories.

The internet unit was established in 2004 to be distinct gate for the mechanical engineering department. This service was being provided in limited way at the beginning where there were ten computers, then this service was increased gradually to include (wireless) service for all teachers to provide their services to employees and students (under graduate , post-graduate, researchers). This unit provides other services, including:

1 - Helping students in the process of search and getting research and reports.
2 - Teaching students to use computer and the questions relating to programs and installation.
3 - Providing printing service for research and reports on papers.
4 – Providing research registration service on discs and copying CD.
5 – Providing scanner service for papers.
6 - Providing Internet service to students.
7 – Providing (wireless) service for all department teachers.
8 - Helping teachers and employees through providing computers maintenance and installation of software.
9 - Providing email service to the department which provides communication between the connected party from inside and outside Iraq, and the presidency of the department as well as responding all queries and answers.

Department Website

Website was set up in 2007 and was developed gradually. Through this website, can do the following functions:

1- Publishing the latest news and activities of department.
2- Defining cadre of the department and identify its branches.
3- Identifying the department curriculum of the four branches.
4- Disseminating lessons lectures on the department site.
5- Disseminating questions of previous years.
6- Disseminating rapid news and announcements on the site.
7- Informing graduates on dates of receiving their graduation documents in the event of readiness.
8- Disseminating various activities of the department (sessions, conferences, seminars and discussions of graduate students).
9- Disseminating sports activities of the department.

Printing and Discs Recording

This service includes providing service of copying reports and research as well as helping in the organizing of reports, research and projects besides teaching them how to print, apply orders, typeset and train.

D. Maintenance and Upgrading of Facilities

General Maintenance

The department gives more attention to services facilities through maintenance unit that follows up all the department belongings including the elevator which contains a reserve battery if the power goes out suddenly , and there are reception and civil defense officers in every building who take responsibility to monitor the building and protect it day and night , as well as there is ongoing perpetuating for health facilities located symmetrically in the building floors(right and left) , as well as providing first aid and essential medicines in the pharmacy in all headquarters of the committees , units, divisions , branches and senior leadership.

Lab. Equipment Maintenance

All equipment, when possible, is maintained by the ME lab manager and maintenance staff. The lab manager perform equipment set-up for various experiments and are readily aware when the equipment requires maintenance or repair. Some complex equipment, such as scanning electron microscopes, has service agreements and is routinely serviced by factory service technicians. Other complex equipment, such as electronic hardness testers and microscopes are regularly serviced by outside specialty technicians. Further support can be obtained from UOT Zone Maintenance. Repairs beyond the capabilities of the lab manager and support staff require bringing in qualified service technicians from outside companies.

The adequacy of all processes relating to equipment planning, acquisition, and maintenance seems adequate. Undergraduate labs in Mechanical Engineering require a large number of different types of modern testing equipment. The requirement for updating obsolete equipment and acquiring equipment with the latest technology to prepare our students for their future careers is critical, and the ME program is dedicated to maintaining this full array of laboratory equipment.

E. Library Services

Department Library

The area of this library is (100) m^2 and is used by students of graduated and under graduated studies and faculty. It has (26) racks of different sizes with two-and three suites which include many titles of books in Arabic and English , besides thesis, magazines and periodicals. The library is managed by three specialized employees using a database and it contains one reading room furnished and air-conditioned.

- The total number of titles is (2805) and the number of books is (5659) includes (267) Arabic Book, (2078) English book. The number of periodicals is (454) in Arabic and (133) in English.
- The number of master's and doctoral thesis is (756) for both of the type and the number added during the current academic year.

• Library Services are dedicated to the employees of the department and the university and students of preliminary and graduate studies.

Central Library

The University of Technology has a large building related to the Central Library composed of 4 floors each floor boasts two halls and each of which covers an area of approximately 400 square meters. It depends on an electronic system - League decimal catalogs – for indexes, titles, authors, publishing houses and the number of prints.

This library Includes suites relating to the scientific and engineering branches such as a special suites for the department of mechanical engineering which has (1600) Arabic Book, (3077) English , (988) thesis and (250) titles of periodicals and magazines. These books can be borrowed by under graduated & graduated studies students and the employees equally through using participation identities for limited period.

Electronic Library

After collecting books, research, Periodicals and thesis in an independent external storage unit, the contents are arranged and renamed to groups, each group inside a file to facilitate the search process as in the following way:

o putting all the engineering and scientific books into portfolio .
o putting all thesis within the thesis portfolio .
o putting all the images within the images portfolio.
o putting all the engineering programs within the programs portfolio.
o putting all the scientific conferences within the conferences portfolio.
o putting all research within the research portfolio .

Scientific journals have been kept within the research file, taking into account putting the name of the magazine and the date of issuance on each file.

Free Books Store

It Includes textbooks for all stages and specializations and has an area of about (125) m^2 and (30) racks holding (2090) books, most of them are in good condition and the rest is in a lower condition than those. The books will be distributed free of charge at the beginning of the school year and being received from the students to be kept at the book store before announcing the final results. The percentage of free books distribution for education at the current year is 85% which is the same as the last year. The distribution of books to the students of the second round is being done in the light of their final results and restored them before announcing the results of the second round.

F. Overall Comments on Facilities

• The department have two buildings M and B; each one has crypt and (4) floors.
• The total area of the two buildings is (3000) m^2.
• There are 40 rooms used as offices for teachers.
• The total area of the offices is (320) m^2 range from smaller space (5) m^2 and the bigger area of 10 m^2.
• There are (22) classrooms ranging in size from (100) m^2, and (250) m^2 and the total area is (2400) m^2.

- Actual Occupancy of classrooms is less than their capacity.
- There are three halls for sessions, conferences and thesis discussion, and the four are dictated for the Council of the department which distributed as follows: (three halls in the building M and its space is (525) m^2 and one in the building B and its area is (100) m^2.
- There are (26) laboratories for four stages and their specialties and two workshops for the initial and graduate studies.
- M and B buildings are furnished, air-conditioned, equipped with internet services.
- There is (180) computers distributed among programming labs, Internet unit, faculty offices and the unites, division of the high command headquarters and the distributor.
- The major pieces of equipment used by the program in support of instruction are listed in **Appendix C**

Table (7.1) classrooms, its area and capacity.

	Hall Name	Area m^2	capacity During the year 2015-2014	actual occupancy During the year 2015-2014
1	M04	154	118	50
2	M05	160	120	50
3	M07	135	108	48
4	M10	94	78	50
5	M13	94	78	50
6	M102	82	72	45
7	M103	80	71	45
8	M104	82	72	43
9	M110	74	65	44
10	M205	40	36	30
11	M206	66	54	42
12	M209	66	54	42
13	M210	66	54	42
14	M307	58	48	30
15	B210	82	72	40
16	B207	62	51	40
17	B209	62	51	40
18	B205	56	45	40
19	B202	82	72	45
20	B201	82	72	45
21	B307	72	64	42
22	B308	72	64	42
23	Atelier1	100	50	40
24	Atelier2	100	50	40

Table(7-2) Labs names, their areas, instruments numbers, and the subjects it serves and the required instruments.

No.	Lab name	Subjects served by the lab	Area m^2	Instruments numbers	
				Available	Valid
1	Mechanics	Mechanics I,II	41	6	6
2	Thermo 1	Thermo	42	5	5
3	Electric	Electric	20	14	9
4	Thermo 2	Thermo	300	3	2
5	Strength of Materials	Strength of Materials	41	7	3
6	Fluid 1	Fluid 1	198	5	5
7	Air Conditioning	Air Conditioning	65	11	10
8	ICE	ICE	145	7	3
9	Theory of machines	Theory of machines	55	15	14
10	Heat transfer	Heat transfer	52	5	5
11	Fluid 2	Fluid 2	198	5	5
12	Control	Control	45	5	5
13	Vibration	Vibration	45	5	5
14	Gases	Gas dynamics	36	1	1
15	Power plants	Power plants	300	4	4
16	Equipment Technology	Equipment Technology	35	4	4
17	Refrigeration	Refrigeration	65	9	8
18	Renewable energy	Renewable energy	41	5	5
19	Airplane engines	Airplane engines	36	Illustrative sec.	-
20	Maintenance of Airplane	Maintenance of Airplane	36	Illustrative sec.	-
21	Flight dynamics	Flight dynamics	36	Illustrative sec.	-
22	Fuel	Fuel	145	Illustrative sec.	2
23	Automotive theory	Automotive theory	11	Illustrative sec.	-
24	Graduate workshop	Graduate students projects	30	Measurement inst. & equip.	
25	Programming 1	Fortran +CAD	30	21	21
26	Programming 2	Matlab+CAD	69	29	29
27	Programming 3	Num. Analysis & Solid W.	38	23	23

CRITERION 8. INSTITUTIONAL SUPPORT

The Air-Conditioning and Refrigeration Engineering Program has sufficient Institutional Support and Financial Resources to assure the quality and sustainability of the program in support of the Program Educational Objectives and Student Outcomes. The decentralized budget affords the branch the opportunity to make prudent decisions and allocate their available resources appropriately. The financial resources are sufficient to attract on an ongoing basis qualified faculty. The resources also insure the department's ability to acquire, maintain and operate the facility and associated equipment.

A. Leadership

The Air-Conditioning and Refrigeration Engineering Branch is led by an experienced administrative leadership. Dr. Mohammed I. Mohsin, assistant Professor, He has a Ph.D. in Mechanical Engineering (Thermal Power), from the University of Technology, Iraq, in 1997. In 1/9/2015, he has been named the Chairman of the Air-Conditioning and Refrigeration Engineering Branch. In addition to leading the branch, some of his time has been devoted to develop new strategic plans that emphasize continuous careful review of the undergraduate curriculum and develop changes that are consistent with modern trends in engineering education.

Department administration/leadership is composed of three major components: Department Dean, Dean Assistances (2) and Chairs of the Branches (3). To ensure seamless integrations for all courses in the Branches, the Area Committee Chairs are the automatic members of the Branch Council. For curricular issues pertinent to a specific program Area, the Area Committee Chair brings those issues back to his Area Committee for discussions and recommending solutions. The recommended solutions are brought back to the Branch council where balanced views from other Areas Committees are developed and discussed before recommending to the general faculty for further discussion and adoption. ABET preparation; assessment in particular, is a major task given to the ABET coordinator. The ABET coordinator is in charge of coordinating the ABET material preparation, assessment, and holding the time lines throughout the entire period of program accreditation. The ABET Report has a stationary spot in the ACRE Faculty Meeting. It outlines and prepares for the annual activities for ABET, particularly the assessments for both Student Outcomes and Program Educational Objectives. By working with the Chair, the ABET coordinator makes annual presentation to both the ACRE faculty and the ACRE Industrial Advisory Council. The Chair leads the discussion, identifies problems, and develops possible solutions with the faculty based on the assessment results.

The Manager of the administration is responsible for Space & Equipment, space distribution/redistribution upon the request from the faculty and is appointed by the Department Dean. Labs Manager is responsible for labs equipment’s, undergraduate lab improvement, and Computer Enhancement Program and is appointed by the Department Dean.

The university have a career counseling office as requested to advice the student about the future job. The Air-Conditioning and Refrigeration Engineering Branch supports the staff in any training they feel will help with the jobs they are asked to perform. All staff members are encouraged to attend the training programs that provided on campus. There are also countless numbers of workshops and trainings available to the staff to attend during the year to help them achieve goals at work. There is even funding that staff can apply for training outside of the University. The department also encourages the staff to further enhance their academics by supporting the staff to attend college. The University provides financial support to attend the conferences outside Iraq. The Ministry and the University also have awards that are given every year based on Staff performance. Each year staff members are nominated for distinguished award and chosen to receive the award in Science Day in April. The staff members are offered salary increases annually based on governmental rules of salary.

B. Program Budget and Financial Support

Program Budget Process and Sources of Financial Support

The budget for the undergraduate program can be divided into the following major categories:

1. Support for Teaching Assistants (TA's).
2. Ministry Budget.

The budgeting process for TA's starts with an accounting of courses that will be offered for the evening study students. The expected costs are determined using average appointment rates and taking into account any general raises in rates that have been approved for the coming academic year. Each year a budget is determined specifically for operations. This budget is split into staff support, equipment maintenance and upgrades, software licenses, and miscellaneous supplies. The budget for staff is based on the appointment rates for permanent staff and the estimated needs for temporary employees (generally student assistants). Major equipment, including computers, is upgraded using a five year replacement plan. Associated costs for these upgrades are estimated each year. Annual miscellaneous supplies and operation costs are estimated using historical data. The Undergraduate Office handles student registration and records, course scheduling, and student advising. The budget for staff in this office is based on the appointment rates for permanent staff and the estimated needs for temporary employees (generally student assistants). Annual operation costs are estimated using historical data.

Funds needed for laboratory equipment maintenance are determined from known maintenance contracts and historical records. Each year additional funds are made available to the department for upgrading teaching laboratory equipment. The amount of these equipment upgrade funds is set each year by the Head's office according to the needs submitted by the department. The budget for the staff responsible for operating and maintaining teaching laboratory facilities is based on the projected appointment rates for these permanent staff. See Table (8-1) attached at the end of this section (Criterion 8. Institutional Support).

Sources of Financial Support

The primary source of funds is an operating budget fixed for the department by the Ministry of Higher Education and Scientific Research. Additional funds are allocated specifically for UOT support. These funds are obtained from various sources, including a set allocation from the university, funds made available due to administrative and research leaves by faculty, and supplementary allocations by the Head's office using "soft" money sources.

Adequacy of Budget

Although constrained by tightening budgets, allocation of funds has been sufficient to maintain operations and teaching needs. There was a reduction in allocations for the 2015-2016 year, and this was handled by reducing non-essential purchases for the department.

Support of Facilities and Equipment

There are four experimental laboratories which require maintenance and occasional upgrading of facilities in the responsibility of Air-Conditioning and Refrigeration Eng. Dept. Funds needed for laboratory equipment maintenance are determined from known maintenance contracts and historical records. Each year additional funds are made available to the department for upgrading teaching laboratory equipment. The amount of these equipment upgrade funds is set each year by the Head's office according to the needs submitted by the department.

Adequacy of Support Personnel and Institutional Services

The department has a wide range of support personnel including undergraduate office staff to advise and register students, technicians to operate and maintain teaching laboratory facilities, administrative assistance to aid faculty, and machine shop technicians to help students in construct models and equipment for projects. Each of these staff positions is adequately funded. Major services provided to the students are computer center, which give students access to specialized software, and the machine shop. These computer services and machine shop service are also adequately funded.

C. Staffing

The department organized different courses through the center of continuing education in several areas, including the use and applications of computer systems, maintenance and how to use them in administrative work. Educational Technology Courses were organized in continuing education center to teach the new staff how to teach, these courses were organized periodically for new member of staff.

Every teacher must enter a course in teaching methods, especially if he is one of the new graduates as well as a course in Computer and thereafter subjected to practice teaching under the supervision of two known faculty staff and for a period of three months and are tested suitability for teaching during this period. He is then evaluated and interviewed by the supervised professors and under the form prepared in advance and then the teacher is called to a meeting of the Scientific Committee in the department

in order to present a subject chosen by him and be asked in order to know the level of his scientific, ability and strength of character to answer questions. The teacher is rated by the Scientific Committee using special form prepared by the board of the department. If the teacher is eligible from the viewpoint of the department to enter the educational process, his papers is sent to be treated in the Scientific Committee of the university and assessed there under a form especially prepared by this Committee, in order to be deciding on the validity or non-validity of the teaching.

D. Faculty Hiring and Retention

The member of staff in the branch is sufficient for teaching.

E. Support of Faculty Professional Development

The university professional development efforts represent a prime objective of the university, which are manifested in the following two areas:

1. Academic Development, which is administered by the Ministry (R & D Office in the MOHESR),
2. University Research Development, which is administered also by the Ministry (R & D Office in the MOHESR), University Funding allocated is adequate for the needs of both lines. Accordingly, both planned activities and allocated funding are adequate for the university professional development.

Table (8-1) Annual income and expenditures for the academic program.			
No. of Item	**Items of financial resources and sources**	**Amount in Iraqi Dinar**	
1	Total budget allocated to the academic program.		
2a	Financial resources and funding sources that academic program depends on them to cover the total annual expenditure.	-	
	Self-funding sources: - Rental Cafeteria - Direct Fees - Wages of Graduation documents - Evening Studies		
2b	Sources of donations and grants:- - - -		
	Other sources: - - -		
3	Total salaries of the teaching staff at the academic program.		
4	Total salaries of employees in the administrative and auxiliary services		
5	Total additional lectures wages charged by faculty.		
6	Total additional lectures wages charged by external lecturers.		
Paragraphs of the allocated budget exchange		**The amount allocated.**	**The amount spent.**
7	Total amounts for the purposes of building maintenance, the hardware, and equipment in the academic program.		-
8	Total amounts for the purposes of equipment, materials, and supplies in the academic program.		
9	Total amounts for the purchase of books, periodicals, and references in academic program	-	-
10	Total amounts for conferences and seminars in the academic program.		
11	Total amounts for the purposes of scientific research and postgraduate studies in the academic program.		
12	Total amounts for the training of teaching staff and employees of the administrative system in the academic program	-	-

13	Total amounts for the purposes of other expenditures in academic program such as: festivities, scientific or artistic exhibitions... Etc.	-	-
14	Total amounts of the workshops in the academic program.	-	-
15	Total amount of student services in the academic program	-	-
16	Total amounts of scientific dispatch in the academic program.	-	-
17	Total amounts for the purchase of textbooks in the academic program. .	-	-
18	Total amounts of incentives and rewards in the academic program.		-
19	Total amounts of other than those mentioned in above		

PROGRAM CRITERIA

1. Curriculum

Criteria for Air-Conditioning and Refrigeration Engineering Program:
Our program satisfy Mechanical Engineering programs requirements. Our curriculum satisfy ABET Mechanical Engineering criteria. The curriculum must require students to apply principles of engineering, basic science, and mathematics; to model, analyze, design, and realize physical systems, components or processes; and prepare students to work professionally in air-conditioning and refrigeration systems areas. The curriculum must include applications appropriate to the program name; There are three major components of the program: (1) foundation in the mathematical and basic sciences, (2) engineering topics in mechanical systems with design applications, and (3) general education in the computer programming, eng. Drawing, materials, and humanities courses.
.

2. Faculty

The program must demonstrate that faculty members responsible for the upper- level professional program are maintaining currency in their specialty area. The curricular requirements of the Air-Conditioning and Refrigeration Engineering Program Criteria are satisfied by attainment of Student Outcomes 'a', 'c' and 'e'. First, the component of "mathematics (including multivariate calculus and differential equations)" was included in our Student Outcome 'a' as described in the section "CRITERION 3 STUDENT OUTCOMES". Therefore, the first part of the curricular requirements is satisfied by attainment of the Student Outcome 'a' and the second part, by the Student Outcomes 'c' & 'e'. The assessment and evaluation of the Student Outcomes 'a', 'c' and 'e' are described in the section "CRITERION 4 CONTINUOUS IMPROVEMENT".

Student Outcomes:
a. an ability to apply knowledge of engineering, science, and mathematics (including multivariate calculus and differential equations).
c. an ability to design systems, components, or processes to meet desired needs within realistic constraints.
e. an ability to identify, formulate, and solve energy and renewable energies engineering problems;
The faculty requirements of the Mechanical Engineering Program Criteria are satisfied by the qualifications of our faculty members, which are described in the section "CRITERION 6 FACULTY".

APPENDICES

Appendix A – Course Syllabi

(Supplement)

Appendix B – Faculty Vitae

(Supplement)

Appendix C – Equipment

The major pieces of equipment used by the program in support of instruction are listed below:

- Wireless LAN Network and (7) ROUTERS and (86) lines.
- (85) Laser printers, (20) colored
- (1600) CD players.
- (550) FLASH RAM.
- (16) copying devices.
- (12) Paper wearing-out devices.
- (70) Bulletin boards distributed throughout the department.
- (62) Large and small conditioners, (4) package conditioners and (76) Split
- (40) Water coolers and (76) refrigerators.
- Pharmacy that contains a first aids and some important medicines (5).
- (146) White Boards of various sizes.
- (9) Vacuum Cleaners.
- (54) Electric heaters and (70) oil heaters.
- Wall clocks.
- (29) Water heaters, (47) air distributors, (16) Mirrors, (8) Cooks, laundry for laboratories, (3) kitchens, (44) heaters and (35) gas bottles.
- (6) Different generators.
- (60) Fire extinguishers and announcements pertaining civil defense published in all floors and courtyards of the department.
- (52) Tanks for storing files.
- (110) iron lockers.
- (13) monitors (DATA SHOW) , (4) smart blackboard , (8) TV, (5) Satellites , (3) screens(LCD) and (28) Over Head.
- (2) Emergency stairs.
- (99) Drawing boards.
- (110) Laptop.
- (6) Scanners.
- (270) ceiling fans, (47) vertical fans and (19) wall fans.
- (56) Shelves, (448) fixed and Plastic chairs, (166) stools, (61) swivel chairs, (180) curtains, (15) carpets, (302) various tables and (20) glazed offices.

Appendix D – Institutional Summary

Programs are requested to provide the following information.

1. The Institution

a. Name and address of the institution

University of Technology
Snaa'a Street, Baghdad, Iraq

b. Name and title of the chief executive officer of the institution

Prof. Dr. Amin Daway Thamir
Chancellor

c. Name and title of the person submitting the self-study report

Dr. Mohammed I. Mohsin, Ass. Prof. and Chair

d. Name the organizations by which the institution is now accredited and the dates of the initial and most recent accreditation evaluations.

The University of Technology is not accredited before.

2. Type of Control

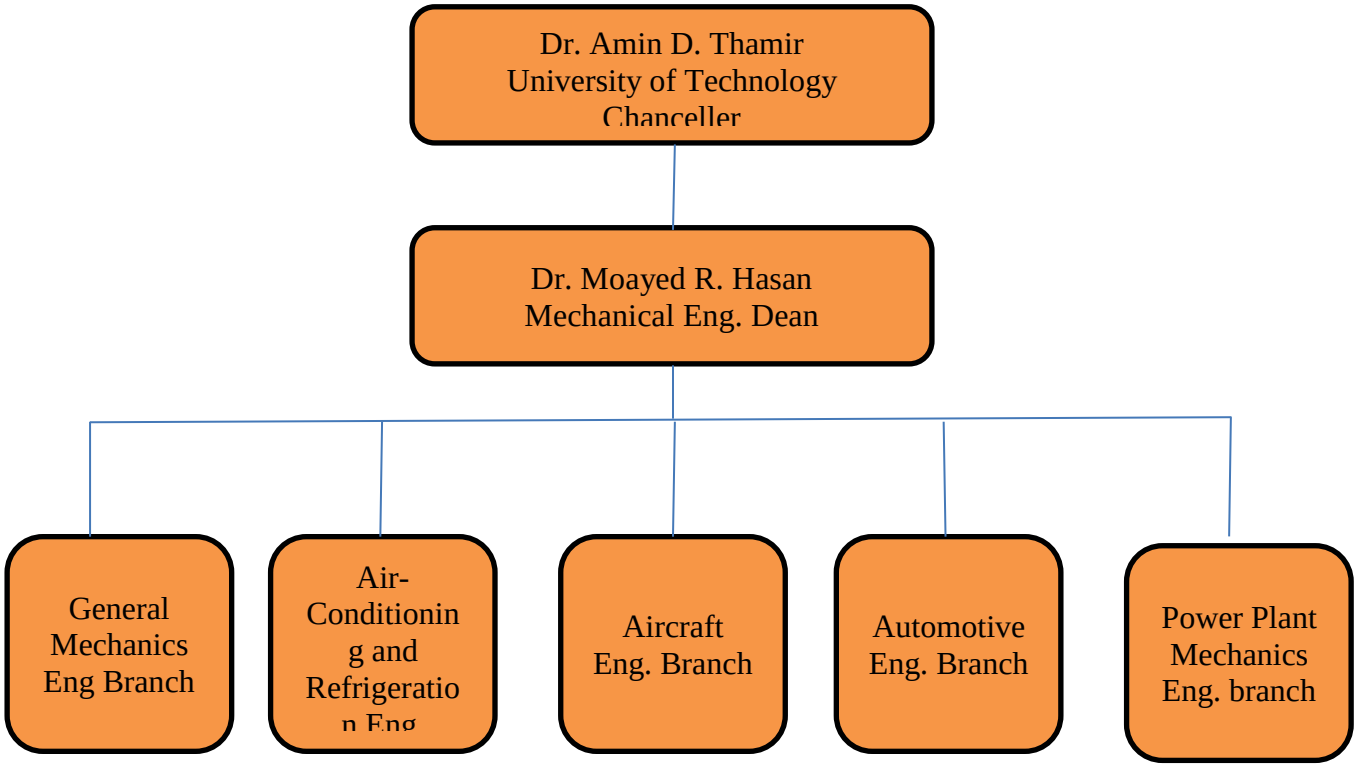
F. Governmental Control

3. Educational Unit

a. College (Department) Overview
The Department of Mechanical Engineering offers an education that not only provides students with skills to solve problems that will make the world a better place, but also encourages their development as leaders and entrepreneurs. High-achieving students have the opportunity to stretch the frontiers of science and technology through undergraduate research with a faculty member. Opportunities to get involved outside the classroom and lab include many engineering student organizations and design teams that allow practical application of the engineering concepts mastered in class, and potential lifetime connections with like-minded students.
Fast facts:
Total number of students:
Under graduate students:

Graduate students:
Total faculty:
Number of alumni: (since 2010-2011)

b. Organizational Chart of Direct Line Reporting



c. Branches

Department of Mechanical Engineering is comprised of five branches with the following degrees:

1- General Mechanical Engineering Branch offers B.Sc. , M.Sc. and Ph.D.

2- Air-Conditioning and Refrigeration Engineering Branch offers a B.Sc. and M.Sc.

3- Aircraft Engineering Branch offers a B.Sc. and M.Sc.

4- Automotive Engineering Branch offers a B.Sc. and M.Sc.

5- Power Plant Mechanics Engineering Branch offers B.Sc.

d. Administrative Head

Dr. Moayed R. Hasan, Dean of the Department of Mechanical Engineering.

e. Information Regarding Administrators

The Mechanical Engineering Department is led by an experienced administrative leadership team. Dr. Moayed R. Hasan Assist. Professor of Mechanical Engineering serves as the head of the department and has done so for 2 years. In addition to leading the department, some of his time has been devoted to developing the under graduate curriculum and developing changes that are consistent with modern trends in engineering education. Assist. Professor Mohammed I. Mohsin serves as the head of Air-Conditioning and Refrigeration Branch since September 2015. He worked in collaboration with the Department Head to developing the curriculum and the Air-Conditioning and Refrigeration engineering program.

4. Academic Support Units

All teaching staff are from Mechanical Engineering Department including basic science and general education.

5. Non-academic Support Units

Department Library:
Department computing facilities:
University Career Services
Department Student Services:

6. Credit Unit

One academic year normally represents 30 weeks of classes. Air-conditioning and Refrigeration Eng. Program of Mechanical Engineering Department use the course hour as the basic unit of academic credit. One theoretical hour is defined as two units, while one laboratory hour is defined as one unit. The graduation requirements are completed, when students have successfully earned a total of 3570 credit hours. The last week of each semester is dedicated to final exams, with each course typically meeting once for a single 180 minute test.

7. Tables

Table D-1. shows the program enrollment and degree data.
Table D-2. shows the personnel data.

Table D-1. Program Enrollment and Degree Data

Air-conditioning and Refrigeration Eng. Program

	Academic Year		Enrollment Year				Total Undergrad	Total Grad	Degrees Awarded			
			1st	2nd	3rd	4th			Associates	Bachelors	Masters	Doctorates
Current Year	2017/ 2018	**FT**	42	36	30	36	144	36	-	36	7	3
		PT	-	-	-	-	-	-				
1	2016/ 2017	**FT**	39	37	39	34	149	34	-	34	8	4
		PT	-	-	-	-	-	-				
2	2015/ 2016	**FT**	35	40	36	35	146	35	-	35	9	4
		PT	-	-	-	-	-	-				
3	2014/ 2015	**FT**	56	37	44	47	184	47	-	47	7	4
		PT	-	-	-	-	-	-				
4	2013/ 2014	**FT**	59	53	49	47	208	47	-	47	7	4
		PT	-	-	-	-	-	-				

Give official fall term enrollment figures (head count) for the current and preceding four academic years and undergraduate and graduate degrees conferred during each of those years. The "current" year means the academic year preceding the on-site visit.

FT--full time
PT--part time

Table D-2. Personnel

Air-conditioning and Refrigeration Eng. Program

Year[1]: 2017/2018

	HEAD COUNT		FTE[2]
	FT	PT	
Administrative[2]	**2**	**-**	**2**
Faculty (tenure-track)[3]	**21**	**-**	**21**
Other Faculty (excluding student Assistants)	**-**	**-**	**-**
Student Teaching Assistants[4]	**-**	**-**	**-**
Technicians/Specialists	**21**	**-**	**-**
Office/Clerical Employees	**1**	**-**	**-**
Others[5]	**1**	**-**	**-**

Report data for the program being evaluated.

1. Data on this table should be for the fall term immediately preceding the visit. Updated tables for the fall term when the ABET team is visiting are to be prepared and presented to the team when they arrive.

2. Persons holding joint administrative/faculty positions or other combined assignments should be allocated to each category according to the fraction of the appointment assigned to that category.

3. For faculty members, 1 FTE equals what your institution defines as a full-time load

4. For student teaching assistants, 1 FTE equals 20 hours per week of work (or service). For undergraduate and graduate students, 1 FTE equals 15 semester credit-hours (or 24 quarter credit-hours) per term of institutional course work, meaning all courses — science, humanities and social sciences, etc.

5. Specify any other category considered appropriate, or leave blank.

Signature Attesting to Compliance

By signing below, I attest to the following:

That (Air-conditioning and Refrigeration Eng. Program) has conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with ABET's *Criteria for Accrediting Engineering Programs* to include the General Criteria and any applicable Program Criteria, and the ABET *Accreditation Policy and Procedure Manual.*

Assist. Prof. Dr. Mohammed I. Mohsin
Head of Air-Conditioning and Refrigeration Eng. Branch

Signature **Date**

Assist. Prof. Dr. Moayed R. Hasan
Dean of Mechanical Engineering Department

Signature **Date**