ABET
Self-Study Report

for

Electromechanical Systems Engineering Program

at

Electromechanical Engineering Department
University of Technology
Baghdad, Iraq

July 1, 2016

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 university started with steady scientific achievements. It was established in 1960 with the idea of establishing an Institute of Industrial Teachers, outlined by the Ministry of Education in cooperation with UNESCO, the founding of the Institute was declared on 22 January 1960, The course of studies was limited to five years after acquiring the high school graduate Certificate, in the subject of Engineering Applications, the first batch was accepted with 45 male students, all of whom were graduates of Industrial secondary Schools. Since founding, the objectives of the Institute were identified by the need for Engineering Technologists, to work in the industrial sector, with emphasis on Engineering projects and Applications research labs, it was also charged with the task of preparing teachers to train professionals in the Industrial and Professional trades, aiming to solve the problems of availability of trainers and workers in those trades, and enabling specialists to manage departments and laboratories. The introduction of specialized learning sessions at the institute, was directed through recommendations and instructions of the Presiding Council of the Institute, and approved by the Ministry of Education. As founded the Institute included the following sections:

- 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.

About Electromechanical Engineering Department:

The first beginnings of the department return back to the year 1960 when established under the name of (High Industrial Institute) and one of its aim was to graduate the industrial lecturers and technical trainers.

In the year 1973-1974, this institute was changedto a new department which opened under the name of (Industrial Lecturers Department) with two branches (Electrical and Mechanical Branch) and later in 1977 a third branch was added as (Construction Branch) and continued to work until 1989 when the acceptance of students in this department was stopped.

In the year 1993-1994 thedepartment was renamedto (Technology Education Department) instead of (Industrial lecturers department) with two branches (Electrical Engineering andMechanical Engineering Branch) in additional to some lectures in the program of

Technology Education. In 2007-2008, the name and title of the department was changed to (Electromechanical Engineering Department), which is considering as a modern engineering disciplines that combine specialized Electrical and Mechanical Engineering, where Electromechanical Engineer deals with electrical equipment and systems for the operation of mechanical devices and these disciplines is an urgent need in the different industrial sectors.The department consists of three branches or three programs, namely:

1-Energy and Renewable Energies Engineering Branch.

2-Electromechanical Systems Engineering Branch.

2-Navagation and GuidanceEngineering Branch.

About Electromechanical Systems Engineering Program:

Electromechanical Systems Engineering branch was established in the Electromechanical Engineering department during the year 2007-2008 and specializes in graduation of applied engineers after four years of study in the jurisdiction of electromechanical systems engineering where graduated students have familiarity and knowledge in electrical engineering and mechanical engineering at the same time.

The Bachelor of Engineering is a professional degree that allows graduates of the program to register in the Iraqi Engineers Association and practice the profession directly after graduation. The four-year program included one years' study common to the major, covering basic engineering and engineering topics courses besides the general education topics, and then three years of specialization in Electromechanical Systems Engineering. The curriculum was also developed to satisfy the Iraqi requirements for licensure.

The program prepares students for technical andengineering support positions in industry. The program builds on a strong foundation ofmathematics and basic sciences, with application of computers design mechanical systems andmanufacturing processes using Computer Aided Design (CAD), Compute Aided Machining(CAM), and Computer Aided Engineering (CAE) tools.

C. Options

The program offers only bachelor's degree in Electromechanical System Engineering/Electromechanical Engineering Department**.**

D. 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 third year at a company that offers professional engineering practice in their field of specialization. The work period covers a minimum of four 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.

E. Program Locations

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

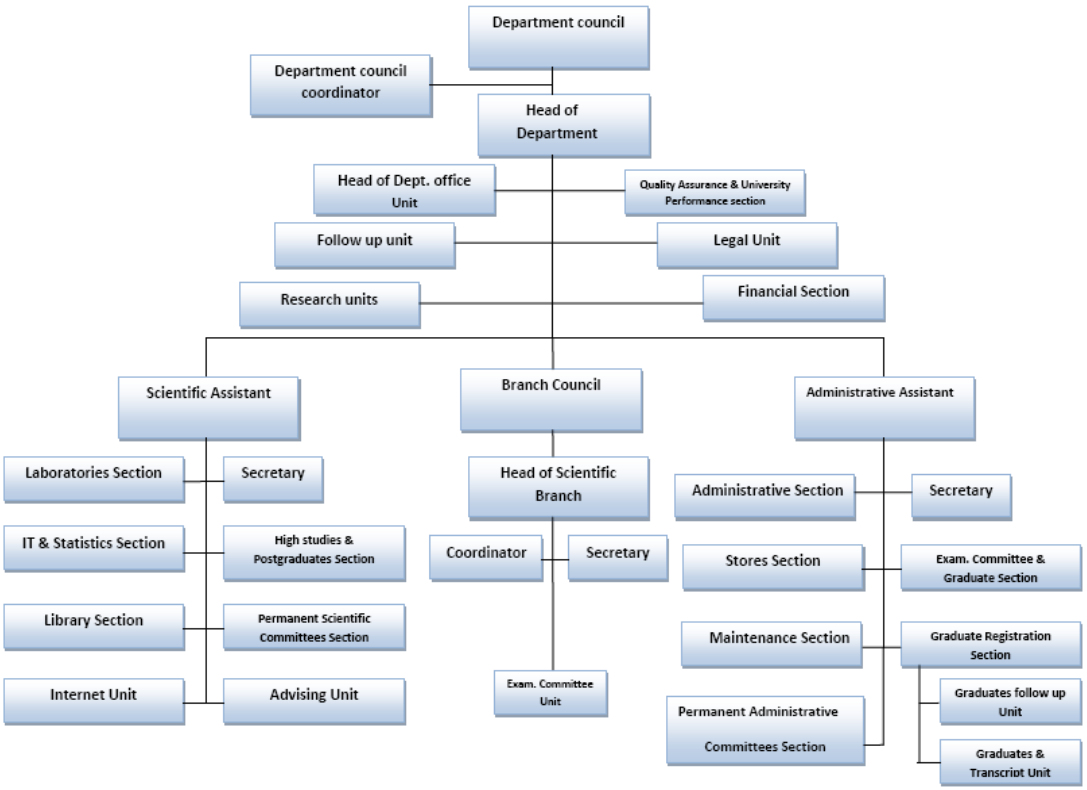
F. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions Taken to Address Them

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

G. Joint Accreditation

The Electromechanical System Engineering Program is jointly accredited by Mechanical and Electrical Engineering Programs, but it is not seeking joint accreditation by more than one commission.

Organizational Structure



CRITERION1. STUDENTS

A. Student Admissions

1- To be accepted for an undergraduate degree in Electromechanical Engineering Department, applicants must hold the official Iraqi Secondary School Certificate. The Ministry of higher Education and Scientific research controls and distributes electronically the admissions of students in the governmental institutions and faculties according to their grades from the Secondary Schools, and these are some of the most important requirements for controlling the accepting of students:

A- To be Iraqi nationality and born on 1991 and up.

B- Have a certificate from an Iraqi secondary school authorized from the ministry of education.

C- Have a medical certificate to ensure that he is qualified.

D- Be a full-time study.

E- Not to be acceptable and continues to study in another college.

F- Non-Iraqi students (arrivals) who obtained a certificate of an Iraqi secondary school admitted according to the central acceptance.

G- Admission 10% of the top graduates of technical institutes.

H- Acceptance of talented student.

2- When student or applicant was admitted in UOT / in the appropriate department according to his grades, then the department will also distribute and register him in the scientific branches of department with priority according to:

- His grades.
- His wish to register in the suitable branch.

3- The above mentioned sequence is documented and must be followed by written rules inwhich 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 branch.

No	Graduate Year	Enrolled
2	2011-2012	82
3	2012-2013	95
4	2013-2014	75
5	2014-2015	63
6	2015-2016	95

No	Graduate Year	Admission Average
1	2014-2015	Min:88.28 to 90.28
2	2015-2016	Min:87.71 to 90.85
3	2015-2016 special Admission	85.71

B. Evaluating Student Performance

The Evaluation process and assessment measures are as follows:

Subject with lab.	Midterm10% + 5% continuous evaluation	Second Midterm 10% + 5% continuous evaluation	10% lab. evaluation	Final Exam 60%	Final Grade 100%
Subject without lab.	Midterm10% + 5% continuous evaluation	Second Midterm 10% + 5% continuous evaluation	N/A	Final Exam 70%	Final Grade 100%
Mechanical Drawing	40% Mechanical Drawing(practical &evaluation)		10% CAD lab.	Mechanical Drawing Final Exam 50%	Final Grade 100%
Mechanical Design	30% theory & 20% Practical		N/A	Mechanical Design Final Exam 50%	Final Grade 100%
Project	Discussion 25% + 15% evaluation		N/A	Discussion 35% + 25% evaluation	Final Grade 100%

Students who were not able to attend the relevant final examination are allowed to take a second attempt exam. Students who were not able to attend the relevant second attempt examination because of conditions out of their control (due to security and violence issues) are allowed to take a third attempt exam (only by the permission of Ministry of Higher Education & Scientific Research). If the student fails to pass the last attempt (third attempt)Students who were not able to attend the relevant final examination are allowed to take a second attempt exam. Students who were not able to attend the relevant second attempt examination because of conditions out of their control (due to security and violence issues) are allowed to take a third attempt exam (only by the permission of Ministry of Higher Education & Scientific Research). If the student fails to pass the last attempt (third attempt) and fails to get 50%, he/she will be considered as (FAIL) in that course. The student allows to take two failed courses to the next level, but if he/she failed in more than two courses, the student has to repeat the academic year. Fail to succeed two successive years, he/she dismiss from the university.

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 transfer students' conditions 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 the first and last year students to the corresponding departments and branches in another university according to 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 and daughters of scientific titles of the faculty have the right to move between the branches of the colleges.
7. Students in community (private) colleges who are pass the final exams with first grade, and at least have a (very good) grade, have the right to move to the corresponding department in the public universities.
8. Acceptance of foreign students (Iraqi and non-Iraqi) from outside Iraq must beperformed by the Ministry of Higher Education and Scientific Researches roles.
   For more information visit the link (http://www.dirasat-gate.org)

D. Advising and Career Guidance

Committee 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 students in grades first and 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 a faculty member, and the style of problem-solving manner true.

3- Develop educational and professional releases that contribute to the benefit of students in the school and the various aspects of life.

4- Participate in field trips for students of the branch to the relevant authorities that serve practically student.

E. Work in Lieu of Courses

N/A

F. Graduation Requirements

The graduation requirements for the initial study is complete theoretical and practical study for four years and by units planned and complete the summer training study plan during the study period and the completion of a graduation project to link the teaching curriculum decision.

G. Transcripts of Recent Graduates

This Committee for the follow-up graduates by holding seminars for them to follow their work places and their opinions through questionnaires distributed to them. The graduate transcript are available as request.

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

Mission Statement of the University of Technology:
Graduate numbers of applied engineers and scientific research cadre 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 ethics engineering and scientific.

Mission Statement of the Electromechanical Engineering Department:
Prepare specialists in the field of electro-mechanical engineering on a distinct level of knowledge and keep abreast of developments in the rapid development in this field and a commitment to professional ethics in work and society field.

B. Program Educational Objectives

The program educational objectives of Electromechanical Systems engineering are:

1- Graduation of a cadre of talented engineers in the field of Electromechanical Systems engineering.
2- Providing the relevant state institutions to specialty above mentioned with applied engineers specialists in designing, using, developing and repairing ofElectromechanical Systems.
3- Supporting scientific research centers, with experts and consultants working in the field of electromechanical systems engineering.

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

The program educational objectives of Electromechanical Systems engineering are consistent with the mission of the Branch. To summarize this mapping between program educational objectives and the mission statements:
1- Program Educational Objectives 1 and 2 are consistent with the mission of meeting high standards of student success by providing access to a learner-centered, high quality educational program.
2- Program Educational Objective 3 is consistent with the mission of producing graduates that are prepared for advanced education and life-long learning and therefore capable of engaging in the process of research and scientific discovery for the benefit of local, regional and global communities.

D. Program Constituencies

The main constituencies of the Electromechanical Systems 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 branch, 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. Many other staff members contribute to the support of the Electro-mechanical systems engineering program; these include all laboratory technicians and staff from other departments, IT unit personnel, and others.

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 Electromechanical System Engineering Branch have an Industrial Advisory Council (IAC). The IAC, which is currently composed of 9 industry leaders from various sectors in the

field of Engineering, meets twice a year and have played an important role on curriculum changes and continuous improvement of the ESE 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 ESE that ensures the department's continuous commitment to anticipate and surpass new academic challenges set forth by an evolving industry. The board experts are:

1- Dr. SamihKahtanJawad, Ministry of Industry & MineralsState Company for Automobile industries and equipment, email: samihkhtan@yahoo.com

2-Dr.SarmadDhiaRidha, Ministry of Electricity Manager of South Baghdad thermal power station (Middle production) GEEP, email: dr.eng.sarmad@gmail.com, 07704848475,07827808775

3- Dr.NazarN.Kadham, Ministry of ElectricityProduction Office Gas stations Dept. Head of North Iraq &Salahaldeen, email: nazarnimma1981@gmail.com, 07815288699, 07901921990.

4- Dr.Mohammed Ahmed Salih, Ministry of Electricity, dr_masalih_abutaeb@yahoo.com.

5-Dr.Hasanen Mohamed Hussain Ali, University of Technology, Manager of Scientific & Engineering Consultant Bureau, PhD.in Mechanical Engineering &Air-conditioning, email: dr.hasanen-hvac@yahoo.com, 079018322138, 07707879813.

6- Eng. Amer K.Kasim, Ministry of Electricity, General Directorate of Al-Russafa Electricity Distribution, 07901280798.

7- Eng.Majid Mohammed Abbas, Ministry of Electricity, Director ofRegulatory Department Planning & Studies Department, email:32_regulatory@moelc.gov.iq, 07809196850.

8-Eng.JalilJafer Ali, Private Sector, Maintenance Manager of Iraqi Company for Cartoon Industry, email: jalil@yahoo.com, 07706282010.

9- Eng.ZadinKhalefaIzghair, Ministry of Industry & Minerals, General Company for textiles and leathers industries, Deputy Project Manager, 07902491598.

E.Process for Review of the Program Educational Objectives

The Electromechanical Systems Engineering program Educational Objectiveshave been reviewed according to the need of labor market and rapid technology development in Electromechanical Systemsto match the mission of the program.The Electromechanical Systems Engineering program Educational Objectiveshave been reviewed according to theneedof labor market and rapid technology development in Electromechanical Systems Engineering to match the mission of the program.These objectives have been reviewed by the advisory Industrial Board of the department who agreed to change to the following:

1. Successfullypracticetheenergyandrenewableenergiesengineeringdisciplines;
2. Contributetosocietyandtheprofession.
3. Engageinlife-longlearningtoadvanceprofessionallythroughcontinuingeducation and training.
4.Succeeding graduate studies in energy and renewable energies engineering or a related field if pursued.

CRITERION 3. STUDENT OUTCOMES

A. Student Outcomes

Students from the Electromechanical System Engineering 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 electromechanical system 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 electromechanical system engineering;
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 Electromechanical System Engineering (ESE) 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. However, the Student Outcomes were slightly modified by specifying the Electromechanical System Engineering components into some of the outcomes in the end of 2015-2016. Since then, minor revisions on the Student Outcomes have been made reflecting the changes in the ABET Criterion 3 as well as the ABET ESE Program Criteria.

B. Relationship of Student Outcomes to Program Educational Objectives

The achievement of the Student Outcomes ensures that our graduates are well equipped to achieve the Program Educational Objectives in actual practice following graduation. 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:

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

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

PEO_S	Student Outcomes (SO_S)										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
PEO #1	**X**	**X**	**X**	**X**	**X**		**X**				**X**
PEO #2						**X**		**X**		**X**	
PEO #3	**X**							**X**	**X**	**X**	
PEO #4	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

The educational objectives of the undergraduate program in Electromechanical System Engineering are to produce graduates who (within a few years of graduation):

1. Successfully practice the electromechanical system engineering disciplines;
2. Contribute to society and the profession;
3. Engage in life- long learning to advance professionally through continuing education and training;
4. Succeed in graduate studies in electromechanical system engineering or a related field if pursued.

PEO #1 states the successful practice as a mechanical engineer. Achievement of the Student Outcomes a, b, c, d, e, g and k ensures that our graduates are adequately equipped with the minimum level of knowledge and skills required for the practice.

PEO #2 emphasizes the service and responsibility as an engineer. Achievement of the Student Outcomes f, h and j will equip our graduates with the required ability.

PEO #3 stresses the need for life- long learning throughout their career. Achievement of the Student Outcomes a, h, i and j will ensure the required ability.

PEO #4 states that our graduates will be successful in the graduate study and the achievement of the Student Outcomes a-k makes the base for the success.

To assure that our graduates have achieved the Student Outcomes, 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 ESE Program will be trained to achieve the Student Outcomes throughout the coursework. The ABET syllabi for the required courses are contained in the Appendix B. Each syllabus describes a weighted correlation of the course to the Student Outcomes as presented in Table 3-2.

Table 3-2 Contribution of Required Courses to Student Outcomes

Subject code	a	b	c	d	e	f	g	h	i	j	k
EMES 111							●	●	●	●	
EMES 122		●		●			●	●			●
EMES 123	●							●	●		
EMES 124		●		●					●		
EMES 125	●				●			●		●	
EMES 136	●	●		●	●		●				
EMES 137		●		●	●						●
EMES 138	●	●		●	●		●				
EMES 139	●	●		●	●		●				
EMES 211						●	●		●		
EMES 222	●	●		●	●	●					
EMES 223	●				●				●	●	
EMES 234	●	●	●	●	●		●				
EMES 235	●				●			●	●		
EMES 236	●	●		●	●		●				
EMES 237	●	●		●	●		●				
EMES 238	●	●		●	●		●				
EMES 239	●	●		●	●		●				
EMES 321	●				●			●		●	
EMES 322	●				●				●	●	
EMES 333	●	●		●	●		●				●
EMES 334	●				●			●		●	
EMES 335	●	●		●	●		●			●	
EMES 336	●	●		●	●		●				
EMES 337	●	●		●	●		●				
EMES 338	●	●		●	●		●				
EMES 339	●		●	●	●	●	●	●		●	
EMES 431	●	●		●	●		●	●			
EMES 432	●	●	●	●	●		●	●	●		
EMES 433	●	●		●	●		●				
EMES 434	●	●		●	●	●	●				
EMES 435	●	●		●	●		●				
EMES 436	●					●		●		●	
EMES 437	●	●		●	●		●				
EMES 438	●				●	●		●	●	●	

CRITERION 4. CONTINUOUS IMPROVEMENT

The assessment and evaluation process of the Electromechanical System Engineering (ESE) 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 ESE curriculum and also used to revise and update the PEOs and SOs as needed. It is noted that the ESE faculty and Industrial Advisory Council (IAC) play an important role in the annual review and assessment process.

A. Program Educational Objectives

The ESE Program utilizes feedback from the alumni and employers of our graduates to assess achievement of the Program Educational Objectives (PEOs). Both of the alumni survey and the employer survey were conducted at the end of the year 2015-2016. The PEOs at the time of the 2015-2016 are listed below. The educational objectives of the undergraduate program in ERE Engineering are to produce graduates who (during the first several years following graduation):

1. Graduation of a cadre of talented engineers in the field of electromechanical systems engineering.
2. Providing the relevant state institutions specialty in above mentioned with applied engineers specialists in designing, using, developing and repairing of electromechanical systems.
3. Supporting scientific research centers with experts and consultants working in the field of electromechanical system engineering.

For the 2015-2016 alumni survey, alumni who graduated between 2010 and 2015 were contacted by meeting inside the department and they were requested to fill out the survey form and a total of 10 alumni responded. In the survey, the alumni were asked how competent they feel now on our PEOs (Ratings: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) based on the education and training they received from our undergraduate program. Many of them replied with 4 or 5 for each PEO. The survey results with the average scores for each PEO are shown in Figure 4.1.

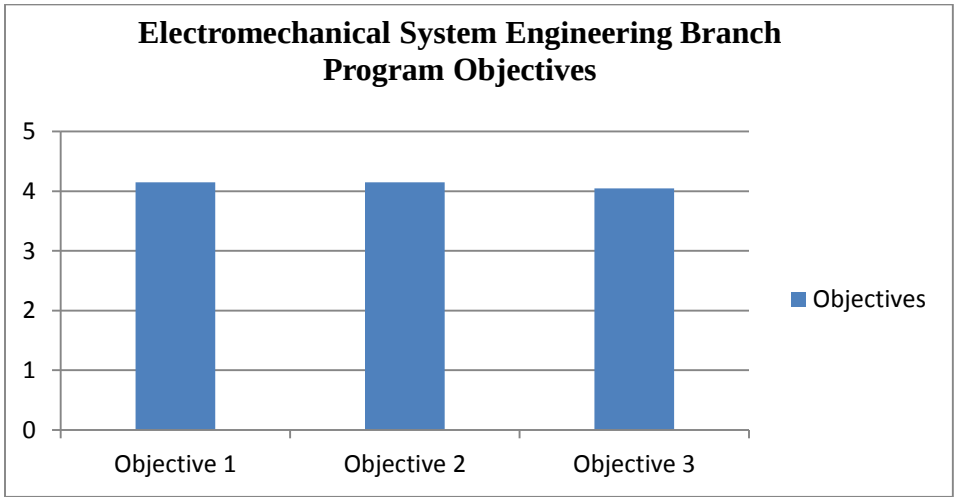


Fig. 4.1 Alumni survey for program Objectives

The survey results were discussed at the ESE faculty meetings during the May 2016. 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 2016.

For the employer survey, approximately 9 employers responded. The employer survey consisted of two sections. In the section 1, the employers were asked to rate our PEOs (Ratings: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). Fig. 4.2 shows the results of the 2015-2016 survey with the average scores for each PEO. The results indicated that our graduates were comparable to the engineers from other schools.

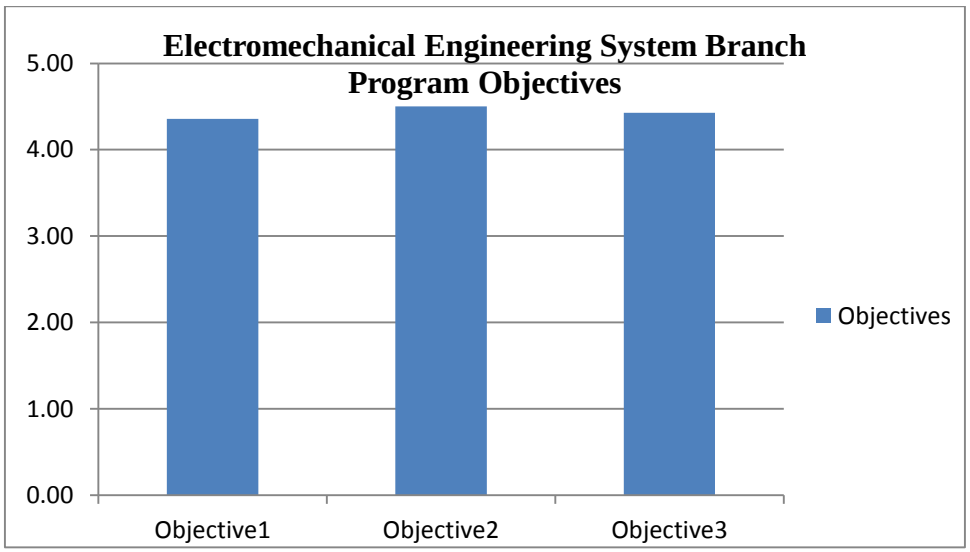


Fig. 4.2 Employers survey

Our PEOs were revised at the end of 2015-2016 PEOs by our constituents. The PEOs were assessed and evaluated through the alumni and employer surveys during the 2015-2016. The revised PEOs are listed below. The educational objectives of the undergraduate program in Energy and Renewable Energies Engineering are to produce graduates who (within a few years of graduation):

1. Successfully practice the electromechanical system engineering disciplines;
2. Contribute to society and the profession;
3. Engage in life- long learning to advance professionally through continuing education and training;
4. Succeed in graduate studies in electromechanical system engineering or a related field if pursued.

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 and Alumni. 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 ESE ABET Coordinator oversees all the assessment process while the ESE Undergraduate Committee discuss the assessment results and recommend the possible actions for improvement to the ESE faculty. The two assessment methods for the assessment and evaluation of Student Outcomes (SOs) are briefly described below.

B.2. Course Assessment

Table 4-1 illustrates which SOs are addressed by the required ESE courses. 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 ESE courses, our students will be trained to achieve the SOs. The assessment results for the 2014-2015 and 2015-2016 course assessments are summarized below in Tables 4.2, the formally pass grade is 50% for all courses, and this was set by Ministry. All courses average was passed 50%. 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. Fig. 4.3 shows the results of the two attempts for 2014-2015, where all student outcomes pass 60% in the second attempt. Fig. 4.4 shows the results of first attempt for 2015-2016. Student work samples were collected as a part of the course assessment and they will be available for review.

Table 4.1 SOs with courses

Subject code	a	b	c	d	e	f	g	h	i	j	k
EMES 111							●	●	●	●	
EMES 122		●		●			●	●			●
EMES 123	●							●	●		
EMES 124		●		●					●		
EMES 125	●				●			●		●	
EMES 136	●	●		●	●		●				
EMES 137		●		●	●						●
EMES 138	●	●		●	●		●				
EMES 139	●	●		●	●		●				
EMES 211						●	●		●		
EMES 222	●	●		●	●	●					
EMES 223	●				●				●	●	
EMES 234	●	●	●	●	●		●				
EMES 235	●				●			●	●		
EMES 236	●	●		●	●		●				
EMES 237	●	●		●	●		●				
EMES 238	●	●		●	●		●				
EMES 239	●	●		●	●		●				
EMES 321	●				●			●		●	
EMES 322	●				●				●	●	
EMES 333	●	●		●	●		●				●
EMES 334	●				●			●		●	
EMES 335	●	●		●	●		●			●	
EMES 336	●	●		●	●		●				
EMES 337	●	●		●	●		●				
EMES 338	●	●		●	●		●				
EMES 339	●		●	●	●	●	●	●		●	
EMES 431	●	●		●	●		●	●			
EMES 432	●	●	●	●	●		●	●	●		
EMES 433	●	●		●	●		●				
EMES 434	●	●		●	●	●	●				
EMES 435	●	●		●	●		●				
EMES 436	●					●		●		●	
EMES 437	●	●		●	●		●				
EMES 438	●				●	●		●	●	●	

Table 4.2 Summary of courses performance

Courses	2014-2015	2015-2016
EMES 111/English Language	70.75	67.31
EMES 122/Computer Science	69.3	62.30
EMES 123/Mathematics	64.09	59.95
EMES 124/Workshops	70.98	69.07
EMES 125/Physical Electronics	62.28	58.76
EMES 136/Fundamental of Electric Engineering	58.45	57.59
EMES 137/Engineering & Mechanical Drawing	66.94	59.06
EMES 138/Engineering Materials	58.84	56.39
EMES 139/Engineering Mechanics	58.64	58.64
EMES 211 / Human Rights /Freedom Democracy	58.25	64.39
EMES 222/Advanced Programming	63.8	64.44
EMES 223/Advanced Mathematics	59.11	76.67
EMES 234/ Devices & Measurements	60.61	56.57
EMES 235/Electrical Circuits	51.83	57.56
EMES 236/Electrical Mechanics	58.95	70.61
EMES 237/Thermodynamics and Fluid Mechanics	57.45	74.91
EMES 238/Electronics	58.8	59.94
EMES 239/Strength of Materials	55.69	61.87
EMES 321/Industrial Engineering	62.7	63.42
EMEs 322/Numerical Analysis	63.1	57.07
EMES 333/Control Theory And Vibrations	58.46	56.75
EMES 334/Power Systems	62.03	62.45
EMES 335/Communications	64.1	61.67
EMES 336/Synchronous and special machines	60.72	65.07
EMES 337/Heat transfer and Hydraulic systems	63.49	55.22
EMES 338/Theory of Machines	59.91	56.82
EMES 339/Mechanical Design	58.59	56.08
EMES 431/Electromechanical Systems and Devices	61	63.15
EMES 432/Designing and Manufacturing Aided with computer (CAD /CAMD)	62.52	62.19
EMES 433/Air-conditioning and Refrigeration	64.22	65.87
EMES 434/Signals and Systems	69.44	63.44
EMES 435/power Electronics and Electrical Drive	63.94	66.68
EMES 436/Automation and Control	66.22	62.17
EMEs 437/Microprocessor and Controllers	66.83	77.91
EMES 438/Project	78.12	78.31

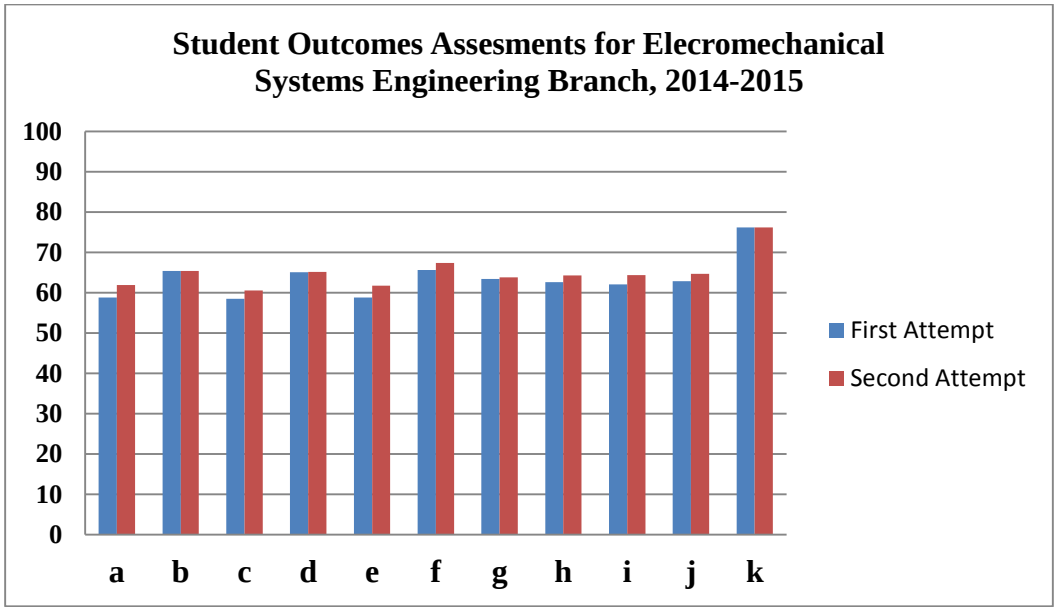


Fig. 4.3 Student outcomes performance through courses for first and second attempts.

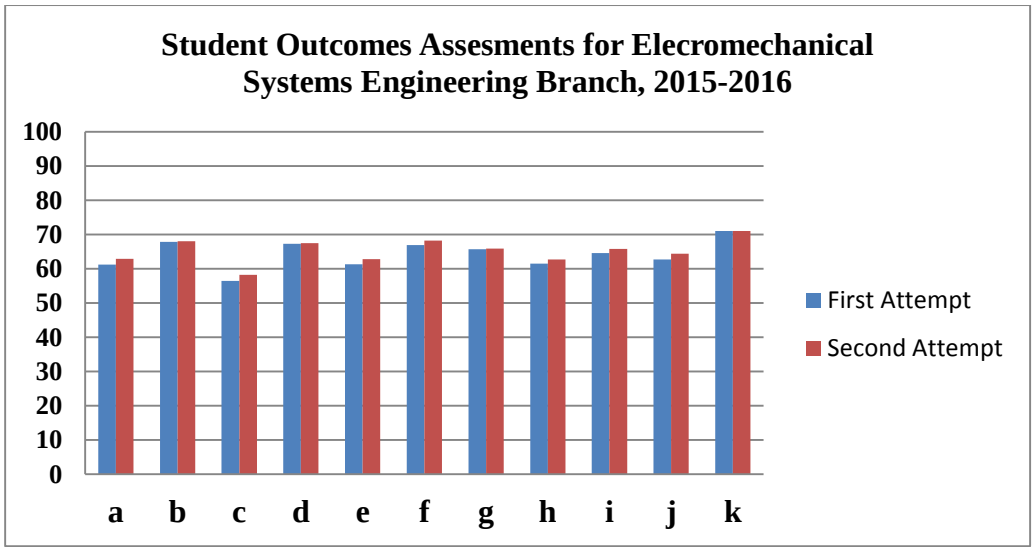


Fig. 4.4 Student outcomes performance through courses for first and second attempts.

B.1. 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, a survey is conducted for the assessment of Student Outcomes. In the survey, the graduating seniors were asked how competent they feel in the areas of the Student Outcomes (Ratings: 1= Disagree Strongly, 2 = Disagree Somewhat, 3 = Agree Somewhat, 4 = Agree Strongly) based on the education and training they received through the ESE

undergraduate program. Figure 4.5 shows the results of the survey with the average scores for each Student Outcome for 2015-2016.

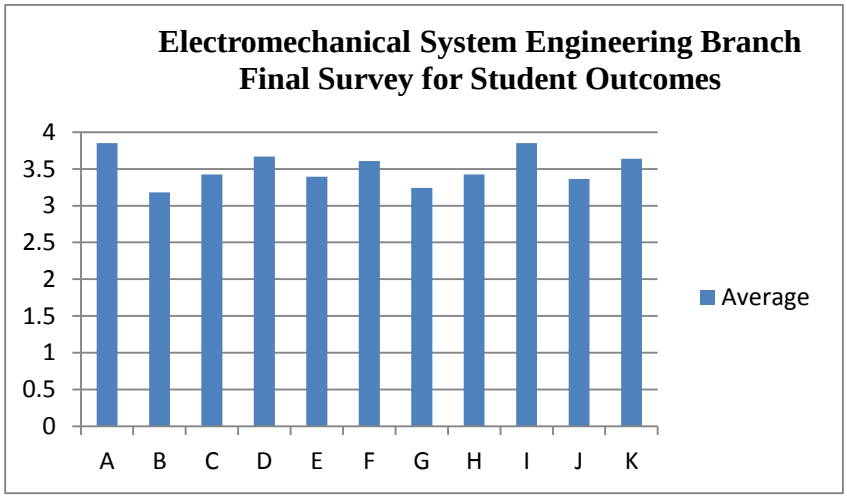


Fig. 4.5 Exit interview survey for student outcomes

B.2. Alumni Survey

The Alumni meet with the Department Chair and Dean at May. A survey is conducted for the assessment of Student Outcomes. In the survey, the alumni were asked how competent they feel in the areas of the Student Outcomes (Ratings: 1= Disagree Strongly, 2 = Disagree Somewhat, 3 = Agree Somewhat, 4 = Agree Strongly) based on the education and training they received through the ESE undergraduate program. Figure 4.6 shows the results of the survey with the average scores for each Student Outcome for 2015-2016.

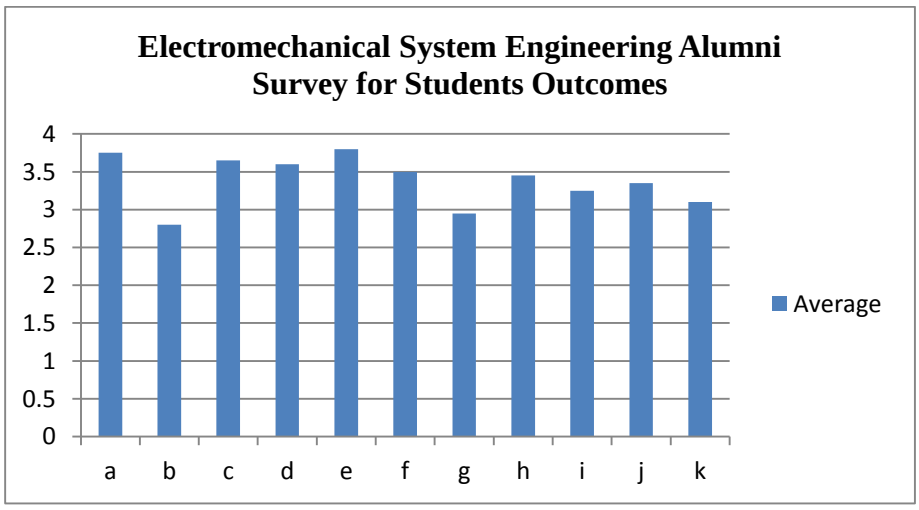


Fig. 4.6 Alumni Survey for student outcomes

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 2015-2016. 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 ESE 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 and Alumni surveys) as described in the previous section. The assessment data are collected during the 2014-2015 and 2015-2016 for courses assessment and 2015-2016 for surveys. The data will analyze by the ESE ABET coordinator during summer. Then, the assessment results are reviewed by the ESE Undergraduate Committee to recommend possible actions for improvement to the ESE faculty at September faculty meetings.

CRITERION 5. CURRICULUM

A. Program Curriculum

A.1. Table 5-1 Curriculum

Table 5-1 illustrates the normal course sequence in the program along with the average section enrollment (lecture, laboratory, recitation) in each course. Table 5-1 is attached at the end of this section (Criterion 5. Curriculum).

A.2. Relation with Program Educational Objectives

The linkage between the Program Educational Objectives (PEOs) and the Student Outcomes (SOs) is shown in Table 5-2. The achievement of the Student Outcomes (SOs) ensures that our graduates are well equipped to achieve the Program Educational Objectives in actual practice following graduation.

ESE Program Educational Objectives (PEOs):

The educational objectives of the undergraduate program in Electromechanical System Engineering are to produce graduates who (within a few years of graduation):

1. Successfully practice the electromechanical system engineering disciplines;
2. Contribute to society and the profession;
3. Engage in life- long learning to advance professionally through continuing education and training;
4. Succeed in graduate studies in electromechanical system engineering or a related field if pursued.

EREE Student Outcomes (SOs):

Students from the ESE 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 electromechanical system 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 electromechanical system engineering;
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

A.3. Relation with Student Outcomes

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 Electromechanical System Engineering Program will be trained to achieve the Student Outcomes throughout the coursework. The ABET syllabi for the required courses describe a correlation of the course to the Student Outcomes as presented in Table 5-3.

A.4. Prerequisite Flow Chart

A flow chart showing the prerequisite structure of the ESE curriculum is attached after Table 5-1 at the end of this section (Criterion 5. Curriculum).

A.5. Major Components of the Program

The Electromechanical System Engineering program produces graduates who are prepared to enter the practice of electromechanical system engineering. There are three major components of the program: (1) foundation in the mathematical and physical sciences, (2) engineering topics in both mechanical and electric systems with design applications, and (3) general education in the humanities/fine arts and social/behavioral sciences.

A.5.1. Mathematics and Physical Sciences

The engineering science fundamentals and engineering design skills are built upon the basic mathematics and physical sciences. The mathematics work begins with a three-course sequence (Math EMES123, EMES223) on differential and integral calculus. The two courses includes topics in limits, derivatives, and the integrals of functions of one variable, work on partial derivatives and multiple integrals is presented. Vector analysis and three dimensional analytical geometry is included in this course. Topics include solution of the first and second order linear differential equations with numerous applications. Laplace transforms, power series solutions, numerical methods and linear systems are included. With this foundation in mathematics, our students have necessary tools for applications in analysis and design. EMES322 Numerical analysis with particular applications in numerical differentiation and integration.

EMES125/ Physics, the aims which can be achieved during teaching this course program are concept of materials science and materials engineering, classification of materials, atomic structure and the type of bonding forces, types of materials and their applications and the mechanical material properties.

It was noted that the number of hours for Math and Basic Science is only 16 hours and this is less than abet requirement (32 hours). In next year (2016-2017), the number of hours will increases to from 16 to 32 hours, each credit hours for Math (I, II, III) and physics will increase from 4 to 8 hours.

A.5.2. Engineering Topics

The aim of the program is to graduate students capable to work as mechanical and electrical engineer in energy and renewable energies field. The engineering topics are divided into four parts; preliminary joint courses, mechanical courses, electrical courses and final joint courses.

Preliminary joint courses:

1. EMES124/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.
2. Computer Courses; EMES122/ Computer Science (Visual BASIC programs), EMES222/ Advanced Programming (C++), EMES322 / Application of Advance Computer (Microprocessors and MATLAB languages).
3. EMES321/ Industrial Engineering, determine the most effective ways for an organization to use the basic factors of production.
4. EMES137/ Engineering and Machine Drawing is to teach students manual drafting and dimensioning of views, explains the principles of orthographic views, multi view projection and sectional view drawing.

Engineering courses are divided into two parts;

Mechanical Courses,

1. EMES237/Thermodynamics and Fluid mechanics, Illustration and discussion the principles of heat, work, internal energy, 1st and 2nd law of thermodynamics as well as applications, this unit of study aims to provide you with an understanding of the fundamentals of fluid mechanics an appreciation of the design principles in fluid systems, the ability to analyses existing fluid systems and contribute to new designs, illustration and discussion the principles of fluid motional flow classification, fluids properties and flow classification/ continuity equation.
2. EMES337/Heat transfer and Hydraulic systems, Illustration of steady and unsteady states conduction, Forced and natural convection, Radiation heat transfer, heat exchanger, hydraulic system, hydraulic pumps, theory and types and controlling valves and actuators.
3. EMES433/Air-Conditioning and Refrigeration, Understand basics of air-condition and refrigeration systems and their operations, have ability to compute the thermal loads, thermal comfort and design conditions, ducts system design, Refrigeration systems and their application, control device and automatic control of the air-conditioning and refrigeration and have ability and knowledge to select air-conditioning and refrigeration equipment's.
4. EMES139/ Engineering Mechanics, This unit of study aims to provide theoreticalknowledge and principles of statics and Dynamics.
5. EMES138/Materials Engineering and Nonmaterial, concept of Materials Science and Materials Engineering, classification of Materials, atomic Structure and the type of Bonding Forces and types of materials, their applications and the Mechanical Material properties.
6. EMES239/Strength of Materials, introduces the fundamental concepts in mechanics of materials is the study of the behavior of solid bodies under load, study the simple bending theory for beams and the simple torsion theory for shafts (circular) and non-circular, deflection of beams, complex stresses, compounds beam and study the failures theories.
7. EMES333/Theory of Control, illustration and discussion the principles of free & forced vibrations and definition, Proceeding to the Student free & forced vibrations of

single degree of freedom, illustration and discussion the Main Theoretical Principles of control systems and understanding of using different system Damping.

8. EMES333/Theory of Vibrations, illustration and discussion the principles of free & forced vibrations and definition, proceeding to the Student free & forced vibrations of single degree of freedom, illustration and discussion the Main Theoretical Principles of free&forced vibrations of multi degrees of freedom systems, understanding of using different system Damping and giving Knowledge about the vibration Machines, Instruments, and Apparatus used in vibrations.
9. EMES338/ Theory of Machine, theoretical knowledge and principles of advanced theory of machine analysis and the ability to analysis and solve the engineering problems, illustration and discussion the main the application of theory of machine for the solution of equation(s) for velocity and acceleration, gear and gear train, belt, fly wheel and friction clutches that occur in most engineering of electromechanical field and the student may also go beyond the subject and perform grid sensitivity, parametric study, stability analysis.
10. EMES432/ COMPUTER ADIED DESIGIN AND MANUFACTURING (CAD/CAM), introduces the fundamental concepts in CAD/CAM systems, transferring part geometry from CAD to CAM for the development of a CNC-ready program and use CAD/CAM software.

Electrical Courses,

1. EMEE136/ Fundamental of Electric Engineering (illustration and discussion the fundamental of electric engineering and definition, proceeding to the student the DC Electrical Circuits, series, parallel, series-parallel and identify the equations voltages &current for circuits above).
2. EMEE235/ Electric Circuits, in electrical engineering, we are often interested in communicating or transferring energy from one point to another. To do this requires an interconnection of electrical devices. Such interconnection is referred to as an electric circuit.
3. EMEE236/ Electrical Machines, Illustration and discussion the principles of DC and AC machines, description of the machine, as well as its operation in electrical machines.
4. EMES238/Electronics, Illustration and discussion the principles of Electronic Engineering, proceeding to the Student different circuits of transistors & Operational Amplifier, illustration and discussion the Main Theoretical Principles of transistors & Operational Amplifiers circuits and -Understanding of using different application of Transistors circuits.
5. EMES234/Measurements and Devices, in different kinds of Electrical measurements.
6. EMES334/Theory of power system, Illustration and discussion the principles of power system, proceeding to the Student power system, illustration and discussion the Main Theoretical Principles of power system, understanding of using different kind of power system and giving Knowledge about the power Machines, Instruments, and Apparatus used in power.
7. EMES335/Communications, illustration of functional Elements of Communication System, classification of Signals, energy and Power Signals, Fourier Series and

Fourier Transform, convolution and Correlation, understanding of using different types of Modulation, understanding of using different types of Demodulation, giving Knowledge about the Noise Figure, understanding of using the various types Transmission Lines and using Smith chart and understanding of using the various types of Antennas.

8. EMES336 / Synchronous and special machines, illustration and discussion the principles operation of synchronous machine and special machines, understanding the applications of using different types of special machines, illustration and discussion the Main Theoretical Principles of synchronous machine and mathematically analysis of special machine and giving Knowledge about the vibration Machines, Instruments, and Apparatus used in vibrations.
9. EMES434/ Signals and Systems, Illustration the theory and principles of Communication System, provides the student with Knowledge about different analogue and digital modulation techniques, illustration and discussion the Main type of signals, identify the fundamental concepts of a Digital Signal Processing, analyze and implement digital signal processing systems in time domain, compute the Fourier series and the Discrete Fourier transform (DFT) of discrete-time signals, analyze digital signal processing systems using Z-transform, sample and reconstruct analog signals, compute circular convolution and the discrete Fourier transform (DFT) of discrete-time signals and analyze and implement digital systems using the DFT and the Fast Fourier Transform (FFT).
10. EMES435/Power electronics and Electrical Drives, illustration and discussion the working principles of the circuit rectifier, inverter, cycloconverter choppers, identify the equations voltage & current for the circuits above, identify the output waveforms & input for the circuits above, identify the working principle of electrical circuits dc drives, ac drives, chopper drives. Induction motor drives, synchronous drives. & identify the equations voltages &current for circuits above and identify the output waveforms for the circuits above.
11. EMES436/Automation and Control System, Illustration and discussion the principles of Basic elements of automation & control production system, proceeding to the Student Advanced automation function &levels in industries with Hardware components for automation process control, illustration and discussion the Main Theoretical Principles of Intelligent control system[neural network ,fuzzy controller &genetic algorithm], understanding the PLC Definitions , PLC basics(block diagram) and giving Knowledge about the construction& architecture of PLC in an automated system.
12. EMES437/Microprocessors & Controllers, The purpose of this scheduled is to teach students the basic principles of 8086 languages and to work programs and projects in laboratory.
13. EMEE339 / Protection Systems with applications, Aims through the study of this article to teach and learn the behavior and action of each element of protection in the electrical system and how these elements according to their nature in addition to contributing to this article to find out ways to protect every element of the electrical system.

14. EMEE432/ Theory of power system, illustration and discussion the principles of power system.
15. EMEE433/ Theory of high voltage engineering, illustration and discussion the principles of generation of high DC and AC voltage.
16. EMEE435/ Power Electronics and Electrical Drives, theoretical and practical experiences in the field of power electronics and electrical drives such as AC to DC converters (Rectifiers), DC to AC converters (invertors), DC to DC converters (DC choppers), AC to AC converters (AC voltage regulator and cycloconverter), speed control of DC motors, and speed control of AC motors (inductions and synchronous motors).

Final Joint Courses,

1. EMES339/Electromechanical design, the objective of this course is to provide the concepts, procedures, data and decision analysis techniques necessary to design machine elements commonly found in electromechanical devices and systems. After completely this course of study, students should be able to execute original designs for machine elements and integrate the elements into a system composed of several elements.
2. EMES431/ Electromechanical Systems and Devices, The course presents the students with the fundamentals for the analysis and design of Automatic, or closed loop, control systems in time domain and frequency domain as well as stability of systems. The practical aspects of servo-mechanisms are describable Hydraulic, D.C. and A.C. servos. Also, on measuring, analog computing, component rating and a synopsis of the problems of instrumentation and industrial control application.

A.5.3. General Education

The third major area of the curriculum is the general education component. The University of Technology has a mandated General Education Requirements for all degrees. To satisfy the General Education Requirements the Energy and Renewable Energy Engineering Program set required courses in the general education component as follows:

EMES111/ English Language, This course will improve the ability of the students to understand, speak, read and write English as a second language with some technical texts. It is also intended to teach them, how to use technical English effectively as a language of instruction, Lab. Experiments and Exercises, examples, using Technical Terminologies as close as possible to the lectures they receive during their study.

EMES211/ Human Rights, Freedom and Democracy, The course covers the concept of human rights and development, definition , classes , properties , and the most important human rights conventions and declarations and international conventions on human rights , and human rights in religions and the role of non-governmental organizations in this field and other human rights issues. The substance of freedom and democracy include the concept of freedom and kinds, democracy and the types and components, individual liberty and freedom forced to reconcile the sovereignty, freedom, democracy during the Greeks time, lobbyists, the most important theories on the nature of election, the rights of minorities in democratic governance and other topics that make the student familiar with the issues.

A.6. Major Design Experience

In the last year, students take Senior Capstone Design, which is the final major design course. In this course, students learn how to apply the basic engineering science and design principles to formulate a design problem, and then follow recommended process to complete the design project. Students are required to demonstrate their ability to use the knowledge of mechanical and electrical materials from the whole undergraduate curriculum. Some professional components if not taught in other courses, such as ethics, life- long learning to keep knowledge up to date, are covered in this course. For the capstone design experience. The students are typically in teams of three people. At the end of the year, all the design teams present their capstone design projects. All the ESE faculty members, representatives from industry and ESE Industrial Advisory Council members are invited at the presentation and they also serve as evaluators for the capstone design projects. The evaluation includes the project evaluation in three parts (overall technical content, presentation, and response to questions), assessment of the related Student Outcomes and comment.

A.7. Cooperative Education

The ESE Program have 4 weeks training in nearby industries during summer after third year. Their participants in the training will give them experience in real engineering work in industries. They also have meetings in final year with University Career Services.

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 ABET course syllabi for all the required courses are contained in Appendix B, as listed in Table 5-4. Part 1 includes the courses taught by the ESE faculty.

Table 5-1 Curriculum

Course (Department, Number, Title) List all courses in the program by term starting with first term of first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE.[1]	*Subject Area (Credit Hours)*				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Maximum Section Enrollment for the Last Two Terms the Course was Offered[2]
		Basic	Engineering Topics Check if Contains Significant Design (√)	General Education	Other		
EMES 111/ English Language	R			4		2014-2016	19
EMES 122/ Computer Science	R		5			2014-2016	19
EMES 123/Mathematics	R	4				2014-2016	19
EMES 124/ Workshop	R		4			2014-2016	19
EMES 125/Physical Electronics	R	4				2014-2016	19
EMES 136/Fundamental of Electric Engineering	R		5			2014-2016	34
EMES 137/ Engineering & Mechanical Drawing	R		2			2014-2016	34
EMES 138/ Engineering Materials	R		5			2014-2016	34
EMES 139/ Engineering Mechanics	R		5			2014-2016	34
EMES 211/Human Rights / Freedom and Democracy	R			2		2014-2016	19
EMES 222/ Advance Programming	R		5			2014-2016	19
EMES 223/ Advance Mathematics	R	4				2014-2016	19
EMES 234/Devices and Measurement	R		5(√)			2014-2016	34
EMES 235/Electrical circuit	R		4			2014-2016	34
EMES 236/Electrical Machines	R		5			2014-2016	34
EMES 237/Thermodynamics and Fluid mechanics	R		5			2014-2016	34
EMES 238/ Electronics	R		5			2014-2016	33
EMES 239/ Strength of Materials	R		5			2014-2016	33

EMES 321/Industrial Engineering	R		4			2014-2016	19
EMES 322/ Numerical Analysis	R	4				2014-2016	34
EMES 333/Control Theory and Vibration	R		5			2014-2016	33
EMES 334/ Power System	R		4			2014-2016	33
EMES 335/Communication	R		5			2014-2016	33
EMES 336/Synchronous and special machines	R		5			2014-2016	33
EMES 337/ Heat transfer and Hydraulic systems	R		5			2014-2016	33
EMES 338/ Theory of Machine	R		5			2014-2016	33
EMES 339/ Mechanical Design	R		4(√)			2014-2016	33
EMES431/Electromechanical Systems and Devices	R		5			2014-2016	32
EMES 432/ Designing and Manufacturing Aided with Computer (CAD/CAMD)	R		4(√)			2014-2016	32
EMES 433/ Air-condition and Refrigeration	R		5			2014-2016	32
EMES 434/Signals and Systems	R		5			2014-2016	32
EMES 435/ Power Electronic and Electrical Drive	R		5			2014-2016	32
EMES 436/ Automation and Control	R		4			2014-2016	32
EMES 437/ Microprocessors & Controllers	R		4			2014-2016	32
EMES 438/ Project	R		3			2014-2016	32

TOTALS-ABET BASIC-LEVEL REQUIREMENTS		54	92	8			
OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM	154						
Minimum Percentage of Total		25%	37.5%				
Total must satisfy either credit hours or percentage	Semester Credit Hours	16	132	6			
	Percentage	10.4%	85.7%	3.9%			

Prerequisite Flow Chart for Electromechanical Systems Engineering

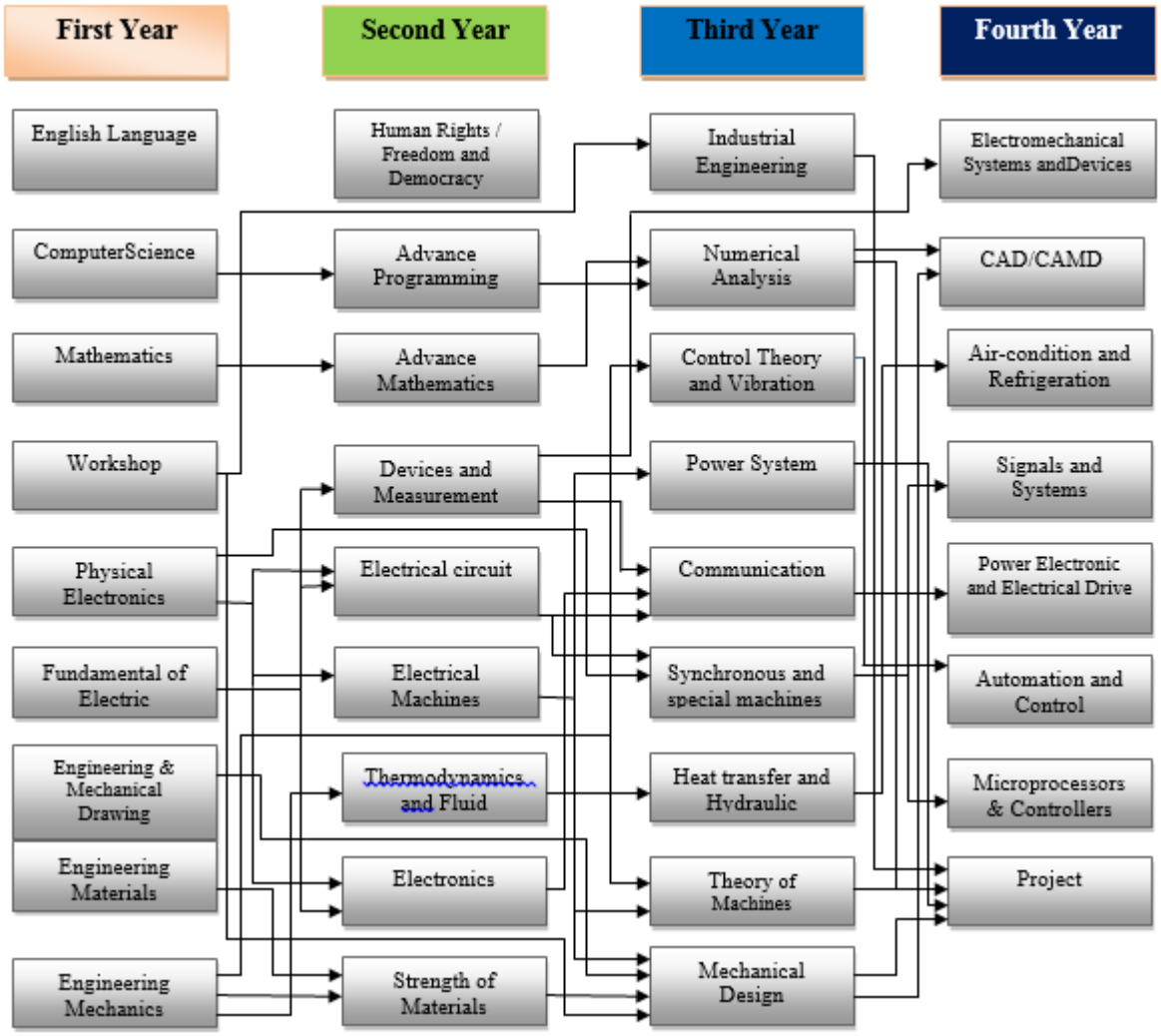


Table 5-2 Mapping of Program Educational Objectives to Student Outcomes PEOs Student Outcomes (SOs)

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

PEO #2						**X**		**X**		**X**	
PEO #3	**X**							**X**	**X**	**X**	
PEO #4	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

Table 5-3 Contribution of Required Courses to Student Outcomes Required Courses Student Outcomes (SOs)

Subject code	a	b	c	d	e	f	g	h	i	j	k
EMES 111							●	●	●	●	
EMES 122		●		●			●	●			●
EMES 123	●							●	●		
EMES 124		●		●					●		
EMES 125	●				●			●		●	
EMES 136	●	●		●	●		●				
EMES 137		●		●	●						●
EMES 138	●	●		●	●		●				
EMES 139	●	●		●	●		●				
EMES 211						●	●		●		
EMES 222	●	●		●	●	●					
EMES 223	●				●				●	●	
EMES 234	●	●	●	●	●		●				
EMES 235	●				●			●	●		
EMES 236	●	●		●	●		●				
EMES 237	●	●		●	●		●				
EMES 238	●	●		●	●		●				
EMES 239	●	●		●	●		●				
EMES 321	●				●			●		●	
EMES 322	●				●				●	●	
EMES 333	●	●		●	●		●				●
EMES 334	●				●			●		●	
EMES 335	●	●		●	●		●			●	
EMES 336	●	●		●	●		●				
EMES 337	●	●		●	●		●				
EMES 338	●	●		●	●		●				
EMES 339	●		●	●	●	●	●	●		●	
EMES 431	●	●		●	●		●	●			
EMES 432	●	●	●	●	●		●	●	●		
EMES 433	●	●		●	●		●				
EMES 434	●	●		●	●	●	●				
EMES 435	●	●		●	●		●				
EMES 436	●					●		●		●	
EMES 437	●	●		●	●		●				
EMES 438	●				●	●		●	●	●	

Program Curriculum Overview

Categories	Subject	Code	Crds.	Total
General Education	English Language	EMES 111	4	6
	Human Rights / Freedom & Democracy	EMES 211	2	
Math. &Basic Sciences	Mathematics	EMES 123	4	16
	Physical Electronics	EMES 125	4	
	Advance Mathematics	EMES 223	4	
	Numerical Analysis	EMES 322	4	
Engineering Topics	Computer Science	EMES 122	5	132
	Workshop	EMES 124	4	
	Industrial Engineering	EMES 321	4	
	Advance Programming	EMES 222	5	
	Basic Electrical Engineering	EMES 136	5	
	Engineering & Mechanical Drawing	EMES 137	2	
	Engineering Materials	EMES 138	5	
	Engineering Mechanics	EMES 139	5	
	Devices and Measurement	EMES 234	5	
	Electrical circuit	EMES 235	4	
	Electrical Machines	EMES 236	5	
	Thermodynamics and Fluid mechanics	EMES 237	5	
	Electronics	EMES 238	5	
	Strength of Materials	EMES 239	5	
	Control Theory and Vibration	EMES 333	5	
	Power System	EMES 334	4	
	Communication	EMES 335	5	
	Synchronous and special machines	EMES 336	5	
	Heat transfer and Hydraulic systems	EMES 337	5	
	Theory of Machines	EMES 338	5	
	Mechanical Design	EMES 339	4	
	Electromechanical Systems and Devices	EMES 431	5	
	Designing and Manufacturing Aided with Computer (CAD/CAMD)	EMES 432	4	
	Air-condition and Refrigeration	EMES 433	5	
	Signals and Systems	EMES 434	5	
	Power Electronic and The Electrical Drive	EMES 435	5	
	Automation and Control	EMES 436	4	
	Microprocessors & Controllers	EMES 437	4	

	Project	EMES 438	3	

CRITERION 6. FACULTY

A. Faculty Size

The size of faculty is 43 instructors.

B. Professional Development

In faculty vitae

C. Authority and Responsibility of Faculty

Instructions for the job description of faculty members

Article 1

A faculty member at University of Technology teaches, performs academic research, provides educational guidance and academic supervision to the students of undergraduate and postgraduate students, provides experience, and participates in academic and other committees.

Article 2

Faculty members dedicate their time to teach at the university. The college council may approve an exception for a faculty member from full-time commitment for reasons that the council finds convincing.

Article 3

I. The faculty member shall work a minimum of (35) thirty-five hours per week.
II. The faculty member shall conduct academic research in accordance to an annual academic plan suggested by the academic department, recommended by the college council, and authorized by the university council, provided that the member shall complete at least one study per year.
III. Hours spent in providing academic supervision and educational guidance by faculty members tasked to do so are considered lectures at the rate of one hour per group, but shall not exceed (4) four hours per week.
IV. The faculty member shall participate in:
    a. University activities (cultural fairs, University Day, college exhibitions, graduation ceremonies, and student events, as well as other academic, social, and educational events upon request.
    b. Writing, translation, and publishing.
    c. Membership in permanent councils and committees inside and outside the university. One additional hour shall be noted for membership in a permanent council.
    d. Intellectual, educational, and academic development of the academic departments by submitting studies, research, reports, plans, educational syllabi, etc.
    e. Conducting tests and monitoring their conduct.
    f. Seminars, conferences, and classes in Iraq and abroad.
    g. Continuing education courses held at the university and elsewhere.
    h. Working at the University's specialized advisory centres, offices, and clinics.

V. The department head shall determine the number of hours needed to accomplish the tasks provided in item IV of this article, which are among the duties of the faculty member, provided that such hours shall not be counted against his quota or articles except for the provisions of item III and paragraphs (c) and (e) of item IV of this article.

Article 4

I. The faculty member's weekly quota shall be as follows:
   a. Professor: (4) eight teaching hours.
   b. Adjunct: (8) ten teaching hours.
   c. Lecturer: (12) twelve teaching hours.

II. The quota may be reduced by no more than two thirds of the quota for those employed at the university's research centres.

III. The number of the faculty member's classroom and practical teaching hours shall be at a rate of hours per week as authorized for the academic rank.

IV. The quota for the faculty member shall be limited to classroom and practical teaching hours, supervision of undergraduate and postgraduate projects, academic supervision, and educational guidance.

V. Two hours shall be reduced from the quota of faculty members whose are fifty years old or older.

VI. The quota for the faculty member during university vacations and the summer quarter shall be zero.

Article 5

Classroom and practical teaching hours for a full-time university faculty member shall be calculated according to the following:

I. The upper limit for theoretical subjects in a single quarter is (3) three subjects in his or her specialty, which may be increased by one subject only in cases of absolute necessity as determined by the college council and subject to the approval of the president of the university.

II. Each hour of practical, applied, or field teaching, training, or discussion shall be calculated as one hour.

III. Supervision of each graduation research project at the undergraduate level shall be calculated as two hours per week, provided that the number of projects supervised is no more than (4) four.

IV. Supervision of each postgraduate student's dissertation shall be calculated as follows:
   a. (3) Three preliminary theoretical hours in the first week for a high diploma.
   b. (4) Four preliminary theoretical hours in the first week for a master's degree.
   c. (6) Six preliminary theoretical hours in the first week for a doctorate.

V. In cases of joint supervision, supervision hours and bonuses are accounted in full for each of the supervisors.

VI. Each hour of teaching at the postgraduate level shall be accounted as the equivalent of two theoretical hours at the undergraduate level for the purposes of compensation for extra lectures.

VII. A faculty member may exclusively teach or supervise postgraduate dissertations, or combine the two, when necessary, with the approval of the college council.

Article 6

I. The number of doctoral theses simultaneously supervised by a faculty member shall not be more than (3) three.
II. The number of magisterialdissertations simultaneously supervised by a faculty member shall not be more than (3) three. However, in cases of absolute necessity, subject to the recommendation of the competent department and the approval of the college council, the number may be increased to no more than (6) six dissertations.
III. Joint supervision of dissertations is possible in cases specified by the department council and authorized by the college council. In such cases, compensation shall be as specified in item V of article 5 of these instructions.
IV. The number of professional higher diplomas supervised by the faculty member shall not be more than (4) four, which may be increased to no more than (6) six in cases of absolute necessity by a decision from the college council.
V. No more than nine dissertations may be supervised individually or jointly.
VI. If a faculty member has supervisory duties of one type (doctoral, magisterial, or higher diploma), supervision shall be as follows:
    a. (5) Five doctoral dissertations
    b. (7) Seven magisterial dissertations
    c. (9) Nine higher diploma dissertations

Article 7

I. The president of the university, as required for the general good, may task a member of the faculty with duties related to the overall academic, educational, and administrative activities. In such a case, the faculty member be entitled to additional hours of no more than (6) six hours per week.
II. The college council may allocate no more than (4) four additional hours per week to the faculty member if the faculty member is tasked with duties related to the development of the educational or administrative process, provided that this takes place at the start of each educational year or quarter.

Content2

Article 8

The weekly quota is:

I. Dean: Zero
II. Assistant Dean: (4) four hours.
III. Department head: (4) four hours.

Article 9

I. The quota of the department coordinator is reduced by (4) four hours per week.
II. The college council may reduce the quota of the person tasked to be the postgraduate coordinator by no more than (4) four hours per week.

Article 10

I. A part-time faculty member who is a physician, dentist, or pharmacist who is employed at the university hospital shall teach the same number of hours as a full-time member of the university service of equal academic rank.

II. A part-time faculty member shall work no fewer than (30) thirty hours distributed as required by the college. Any additional hours shall be treated as overtime pursuant to the effective instructions on lecture pay.
III. Priority shall be given to full-time faculty members when forming branch councils and the Saddam Medical College Council.
IV. Part-time faculty members may practice their professions outside of official working hours.
V. Priority shall be given to full-time faculty members in academic courses and dispatches.

Article 11
A part-time faculty member shall teach the same quota for his or her academic rank as a fill-time member, provided that his or her weekly hours are no more than (29) twenty-nine hours.

Article 12
The Chancellor of the university may dedicate faculty members to work at the university administration, academic research centres, and academic authorities and centres.

aculty name	Highest Degree Earned – Field and Year	Rank	Type of Academic Appointment T, TT, NTT	FT or PT	Years of Experience			Professional Registration/ Certification	Level of Activity H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Hussain J. Mohammed	Ph.D. in Mech. Eng. (1986)	Prof.	T	FT	30	12	12	_	H	H	H
Hosham S. Anead	Ph.D. in Elect. Eng.	A. Prof.	T	FT	_	14	14	_	H	H	H
Khansaa D. Salman	Ph.D. in Mech. Eng. (2004)	A. Prof.	T	FT	_	34	34	_	M	H	H
Saad T. Hamidi	Ph.D. in Mech. Eng. (1997)	A. Prof.	T	FT	32	11	11	_	H	H	M
Farag M. Mohammed	Ph.D. in Mech. Eng. (2003)	A. Prof.	T	FT	20	12	12	_	H	H	H
Shereen F. Abdul Karim	Ph.D. in Elect. Eng. (2004)	A. Prof.	T	FT	4	23	23	_	H	H	H
Jamal A.K. Mohammed	Ph.D. in Elect. Eng. (2007)	A. Prof.	T	FT	_	14	14	_	H	H	H
Sahira A. Qanbar	Ph.D. in Methods of Teaching Physics (1996)	A. Prof.	T	FT	15	21	21	_	M	M	M
Raheek I. Ibrahim	Ph.D. in Chem. Eng. (2007)	A. Prof.	T	FT	_	17	17	_	M	H	M
Fikrat A.K. Fattah	Ph.D. in Elect. Eng. 1993.	A. Prof.	T	FT	_	22	22	_	H	H	H
Hussein T. Rishaq	Ph.D. in Elect. Eng. (2005)	A. Prof.	T	FT	_	10	10	_	H	M	M
Hayder S. Hassan	Ph.D. in Education psychology (2010)	A. Prof.	T	FT	_	10	10	_	M	M	H
Zainab K. Hantoosh	M.Sc. in Metallurgy Eng. (1990)	A. Prof.	T	FT	_	32	32	_	H	M	M
Maarib R. Abdulhassan	M.Sc. in Metallurgy Eng. (1990)	A. Prof.	T	FT	_	32	32	_	M	H	M
Azhar S. Ameed	M.Sc. in Mech. Eng. (1999)	A. Prof.	T	FT	_	16	16	_	H	H	H
Enaam O. Hassoun	Ph.D. in Mech. Eng. (2006)	A. Prof.	T	FT	_	29	29	_	H	H	M
Abdul Jabbar O. Hanfesh	Ph.D. in Elect. Eng. (2009)	Lect.	T	FT	_	13	13	_	H	H	H
Wameidh N. Aldeen	Ph.D. in Elect. Eng.	Lect.	T	FT	_	29	29	_	H	H	M

Aseel A. Abdulrazak	Ph.D. in Mech. Eng. (2011)	Lect.	T	FT	_	20	20	_	M	H	H
Abass F. Bedi	Ph.D. in Mech. Eng.	Lect.	T	FT	_	33	33	_	M	M	H
Qusay K. Mohammed	Ph.D. in Mech. Eng. (2006)	Lect.	T	FT	_	28	28	_	M	H	M
Ali K. Jebur	Ph.D. in Mech. Eng. (2013)	Lect.	T	FT	12	13	13	_	H	M	M
Intessar A. Hadi	Ph.D. in Mech. Eng. (2004)	Lect.	T	FT	_	29	29	_	M	H	M
Shatha K. Baqir	Ph.D. in Elect. Eng. (2004)	Lect.	T	FT	_	29	29	_	H	M	M
Abdul Jabbar M. Ahmed	Ph.D. in Mech. Eng.	Lect.	T	FT	16	12	12	_	H	H	M
Ghaidaa K. Salih	Ph.D. in Elect. Eng. (2003)	Lect.	T	FT	_	22	22	_	H	M	M
Huda A. Zienl	Ph.D. in Metallurgy Eng. (2014)	Lect.	T	FT	_	22	22	_	M	H	M
Haitham M. Salih	M.Sc. in Mech. Eng.	Lect.	T	FT	24	13	13	_	M	M	M
Abdul Kareem K. Abdul Raheem	M.Sc. in Elect. Eng.	Lect.	T	FT	_	_	_	_	H	M	H
Sabah N. Mahmood	M.Sc. in Mech. Eng. (2005)	Lect.	T	FT	_	32	32	_	M	H	M
Asifa M. Mohammed	M.Sc. in Mech. Eng. (2006)	Lect.	T	FT	_	29	29	_	H	M	H
Basill A. Salman	M.Sc. in Elect. Eng. (1983)	Lect.	T	FT	26	10	10	_	H	H	H
Ahlam A. M. Ali	M.Sc. in Mech. Eng. (2006)	Lect.	T	FT	_	34	34	_	H	M	M
Ahmad H. Khuder	M.Sc. in Mech. Eng. (2005)	A. Lect.	T	FT	11	13	13	_	M	M	H
Dina H. Shaker	M.Sc. in Elect. Eng. (1998)	A. Lect.	T	FT	_	11	11	_	M	H	M
Rajaa K. Jaber	M.Sc. in Elect. Eng. (2002)	A. Lect.	T	FT	_	14	14	_	H	M	M
Rawa A. Helal	M.Sc. in Physics Science (2009)	A. Lect.	T	FT	_	16	16	_	M	M	H
Enas M. Abed	M.Sc. in Mech. Eng. (2006)	A. Lect.	T	FT	_	19	19	_	H	M	M
Anmar K. Ibrahim	M.Sc. in Elect. Eng. (2006)	A. Lect.	T	FT	_	11	11	_	M	H	M
Bassam A. Ahmed	M.Sc. in Mech. Eng. (2014)	A. Lect.	T	FT	_	15	15	_	M	M	H
Lamyaa K. Hassan	M.Sc. in Mech. Eng. (2006)	A. Lect.	T	FT	_	17	17	_	H	M	M
Nidhal Y. Nasser	M.Sc. in Elect. Eng. (1997)	A. Lect.	T	FT	13	22	22	_	H	M	M
Athraa S. Hasan	M.Sc. in Elect. Eng.	A. Lect.	T	FT	_	9	9	_	H	M	M
Rafah K. Mahmood	M.Sc. in Elect. Eng.	A. Lect.	T	FT	_	8	8	_	H	M	M

Table 6-1 Faculty Qualification, ESE

No.	Faculty Member (name)	PT or FT	Classes Taught (Course No. /Credit Hrs.) Term and Year	Program Activity Distribution			% of Time Devoted to the Program
				Teaching	Research or Scholarship	Other	
1	Dr. Hussain J. Mohammed	FT	EMES 339 / Mechanical Design / 3rd year.	70%	20%	10%	100%
2	Dr. Hosham S. Anead	FT	EMES 335 / Communications / 3rd year.	70%	20%	10%	100%
3	Dr. Khansaa D. Salman	FT	EMES 138 / Engineering Materials / 1st year.	80%	20%	-	100%
4	Dr. Saad T. Hamidi	FT	EMES 433 / Air-condition and Refrigeration / 4th year.	80%	20%	-	100%
5	Dr. Farag M. Mohammed	FT	EMES 432 / (CAD/CAMD)/4th year.	80%	20%	-	100%
6	Dr. Shereen F. Abdul Karim	FT	EMES 236 /Electrical Machines / 2nd year.	80%	20%	-	100%
7	Dr. Jamal A. Mohammed	FT	EMES 235 / Electrical circuit / 2nd year.	80%	20%	-	100%
8	Dr. Sahira A. Qanbar	FT	Computer Science Lab. / 1styear.	100 %	-	-	100%
9	Dr.Raheek I. Ibrahim	FT	EMES 237 / Thermodynamics and Fluid mechanics / 2nd year.	80%	20%	-	100%
10	Dr. Fikrat A.K. Fattah	FT	EMES 136/Fundamental of Electric Engineering / 1st year.	80%	20%	-	100%
11	Dr. Hussein T. Rishaq	FT	EMES 322/ Numerical Analysis / 3rdyear.	100 %	-	-	100%
12	Dr. Enaam O. Hassoun	FT	EMES 338/ Theory of Machine / 3rdyear.	100 %	-	-	100%
13	Dr. Hayder S. Hassan	FT	EMES 211/Human Rights / Freedom and Democracy	100 %	-	-	100%
14	Zainab K. Hantoosh	FT	EMES 137 / Engineering & Mechanical Drawing / 1st year.	80%	20%	-	100%

15	Maarib R. Abdul hassan	FT	EMES/ workshop/ 1st year 124	80%	20%	-	100%
16	Azhar S. Ameed	FT	EMES123 / Mathematics/ 1st year.	70%	20%	10%	100%
17	Dr. Wameidh N. Aldeen	FT	EMES 435/ Power Electronic and Electrical Drive / 4thyear.	100 %	-	-	100%
18	Dr. Shatha K. Baqir	FT	EMES 238/ Electronics 2ndyear.	100 %	-	-	100%
19	Dr. Ghaidaa K. Salih	FT	EMES 136 / Fundamental of Electric Engineering / 1st year.	100 %	-	-	100%
20	Dr. Abdul Jabbar O. Hanfesh	FT	EMES 236 /Electrical Machines / 2nd year.	70%	20%	10%	100%
21	Dr. Aseel A. Abdulrazak	FT	EMES 239/ Strength of Materials / 2nd year.	100 %	-	-	100%
22	Dr. Abass F. Bedi	FT	Strength of Materials Lab. / 2nd year.	80%	20%	-	100%
23	Dr. Qusay K. Mohammed	FT	EMES 139/ Engineering Mechanics / 1st year.	80%	20%	-	100%
24	Dr. Ali K. Jebur	FT	EMES 333/Control Theory and Vibration / 3rdyear.	80%	20%	-	100%
25	Dr. Intessar A. Hadi	FT	Engineering Mechanics Lab. / 1st year.	80%	20%	-	100%
26	Dr. Abdul Jabbar M. Ahmed	FT	Strength of Materials Lab. / 2nd year.	100 %	-	-	100%
27	Dr. Huda A. Zienl	FT	EMES 138 / Engineering Materials / 1st year.	100 %	-	-	100%
28	Haitham M. Salih	FT	Vibration Lab. / 3rdyear.	100 %	-	-	100%
29	Sabah N. Mahmood	FT	Engineering Materials Lab. / 1st year.	80%	20%	-	100%
30	Asifa M. Mohammed	FT	EMES 222/ Advance Programming / 2nd year.	80%	20%	-	100%
31	Basill A. Salman	FT	Engineering Mechanics Lab. / 1st year.	90%	-	10%	100%

32	Ahlam A. Mohammad Ali	FT	EMES 339 / Mechanical Design / 3rd year.	80%	20%	-	100%
33	Ahmad H. Khuder	FT	Auto CAD Lab. / 1stYear.	100 %	-	-	100%
34	Dina H. Shaker	FT	EMES 125 / Physical Electronics / 1stYear.	100 %	-	-	100%
35	Rajaa K. Jaber	FT	EMES 434/Signals and Systems / 4thYear.	100 %	-	-	100%
36	Rawa A. Helal	FT	Engineering Mechanics Lab. / 1st year.	100 %	-	-	100%
37	Enas M. Abed	FT	Theory of Machines Lab. / 3rd year.	100 %	-	-	100%
38	Anmar K. Ibrahim	FT	EMES 223/ Advance Mathematics / 2ndYear.& EMES 437/ Microprocessors & Controllers / 4th year.	100 %	-	-	100%
39	Bassam A. Ahmed	FT	EMES 339 / Mechanical Design / 3rd year.	100 %	-	-	100%
40	Lamyaa K. Hassan	FT	Vibration Lab. / 3rdYear.	100 %	-	-	100%
41	Nidhal Y. Nasser	FT	EMES 234/Devices and Measurement / 2ndYear.	80%	20%	-	100%
42	Abdul Kareem K. Abdul Raheem	FT	Programming Lab. / 2nd year.	100 %	-	-	100%
43	Athraa S. Hasan	FT	EMES 436/ Automation and Control / 4th year.	100 %	-	-	100%

Table 6-2 Faculty Work Load Summary, ESE

Area Committees	ESE Faculty
Applied Mechanics and Materials	1) Dr. FaragMahel Mohammed 2) Dr. KhansaaDawood Salman 3) Dr.Enaam O. Hassoun 4) Dr. Qusay Khalid Mohammed 5) ZainabKadhumHantoosh 6) MaaribRidha Abdul Hassan
Thermodynamics and Fluid	1) Dr. Saad Tami Hamidi 2) Dr.Raheek Ismael Ibrahim
Electronics and Measurements	1) Dr. Fikrat A.K. Fattah 2) Dr. Jamal Abdul-Kareem Mohammed 3) Dr. ShereenFaik Abdul Karim 4) Dr. Abdul JabbarOwaidHanfesh
Communications	1) Dr. HoshamSaliemAnead

Table (6-3) ESE Area Committees

CRITERION7. FACILITIES

The facilities available to the faculty and staff of the Electromechanical Systems Engineering branch are adequate for the needs of the undergraduate curriculum The Electromechanical Systems Engineering branch is housed in the main building of electromechanical department that was built in 1975. This building is composed of learning classroom, a conference room, several laboratories, and faculty/staff office space.

A.Electromechanical Systems Engineering Staff, Faculty Offices andClassrooms:

The Electromechanical SystemsEngineering branch office is staffed by a branch chief located on the first floor along with the branch coordinator office. There are also three offices, meeting office, quality assurance and university performance committee office and follow-up student's committee office. The faculty offices are large, well maintained and easily located by both students and visitors. The faculty offices located on the second floor. The branch consist of two buildings are made up the main building, which are of 2160 square meters in addition to an estimated 300 square meter green space. The first building contains the head of the branch as well as a number of lecturers rooms and lecture halls and ceremony, laboratories, meeting room and the Internet and a library section, while the second building of the section which is the same area of 1500 square meters which contains the rest of the lecturers, laboratories and the rest of the classrooms rooms. The department has a meeting hall and student seminars equipped with display screens and a modern area of 283 square meters and absorb energy (234) people. The branch contains (14) Hall of preliminary studies and (1) Hall of Graduate Studies and the details of these halls in terms of space and energy absorption are described in the following table:

Lecturing rooms (Halls)		Area (m^2)	Capacity
Room code	Use as		
1	Lecture room	$143m^2$	165
2	Lecture room	$143m^2$	162
3	Lecture room	$143m^2$	147
4	Lecture room	$143m^2$	126
5	Lecture room	$152m^2$	126

Table 7-1: Classrooms used for EMES required courses

6	Lecture room	141m^2	126
7	Lecture room	155m^2	122
8	Lecture room	150m^2	122
9	Lecture room	47m^2	35
10	Lecture room	47m^2	35
11	Lecture room	47m^2	48
12	Lecture room	47m^2	38
13	Lecture room	47m^2	44
14	Lecture room	47m^2	47
15	Lecture room	47m^2	33
16	Lecture room	47m^2	76
17	Lecture room	50m^2	49
18	Lecture room	50m^2	49
19	Lecture room	50m^2	49
DW	Tech.drawing	147m^2	42
HD	High studies	148m^2	28
Alkiny hall	Seminars,conferences	283m^2	234
LIB	library	144m^2	35
INT	internet	35m^2	10

The Electromechanical Systems Engineering Branch contains (21) lecturers room with different areas of energy and a capacity of between 3-5 people and form in which it covers the need for staff and are air-conditioned and equipped with all the necessary equipment from saluting Furniture and laptop computers and the Internet. The department contains the unity of the Internet taken advantage of professors and graduate students and primary, and a capacity to use (12) calculator, and it is worth mentioning has been added WIFI network that facilitates use by all section categories, and the most important tasks entrusted to the unity of the Internet

is to update and maintain the website of the department and the dissemination of news section and the results of the examinations and the delivery of Internet lines to lecturers rooms.

Conference Room

The EMEE conference room (3) is used as a faculty meeting room, an interview room and a classroom with modern data show and screens, which is an area (283 m^2) and capacity (234) people.

Laboratories

AllElectromechanical Systems Engineering laboratories are described in Table 7-2, with room number, size and courses taught for each room along with the condition of the laboratory and its adequacy for instruction.

Table 7-2: EMES Laboratory Facilities

	Laboratory	Stages beneficiary	capacity	Area(m^2)
1	Electromechanical devices	EMES4,EMEE4	23	75
2	Control	EMES3,EMEE3	23	75
3	Materials	EMES1	21	16
4	Strength of Materials	EMES2,EMEE2	20	170
5	Basic of Electrical Engineering	EMES1,EMEE1, EMEN1	24	60
6	communications	EMES3	22	300
7	Electronics	EMES3,EMEE2	20	274
8	Measurements	EMES2,EMEE2	15	84
9	Signals and Systems	EMES4	22	300
10	Vibrations	EMES3	18	50
11	Theory of Machines	EMES3, EMEE2	18	50
12	Computer	Fall all classes	20	60
13	Air conditioning and Refrigeration	EMES4	20	45
14	Engineering Mechanics	EMES1,EMEE1, EMEN1	12	24

B. Computing Resources

Electromechanical Systems Engineering faculty and staff have access to all computing resources, including the availability for desk top and/or lap top computers, printers, and any necessary software. Computers have access to the Internet through high speed wired connections. All campus buildings have both wired and wireless network connectivity. Computer service requests are processed through the campus Information Technology Department. The most commonly used computer lab by Electromechanical Systems Engineering majors is room () in the main Building. This computer laboratory composed is (33) workstations, projectors, and standard campus software on all machines. All residence

halls are wired for internet and network access.The software that is used within the curriculum includes Microsoft Office applications, MATLAB /Simulink, AutoCAD, Automation studio…... All of the computer hardware and software systems more than adequately support Electromechanical Systems Engineering program educational objectives and outcomes.

C. Guidance

Branch interested in determining graduation projects for students, which is a solution to the problems of industrial and dilemmas in the work field and to provide appropriate solutions that are derived from the jurisdiction of the branch.The branch has laid the foundations for deepening the relationship between students and field work in the industrial and productive institutions by sending groups of students for summer training in these institutions to serve and strengthen that relationship.

D. Maintenance and Upgrading of Facilities

Describe the policies and procedures for maintaining and upgrading the tools, equipment, computing resources, and laboratories used by students and faculty in the program.

E. Library Services

The branch contains in addition to the Central University Library to its own library of 144 square meters and with a capacity of 35 students, and the table below represents assets that serve the student and teaching in their respective fields.

Desktop business computers.	2
Computing used for sources and references databases	5
Computer disks where scientific research.	252
Scientific movies.	20
Number of book titles.	2173
Number of patrols addresses.	23
Books borrowed daily rate.	10

CRITERION8. INSTITUTIONAL SUPPORT

The Energy and Renewable Energies Engineering 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

Authorities and Tasks of Academic Programs Principals and Teaching Staff Members

Important Notes:

The Electromechanical System Engineering Branch is led by an experienced administrative leadershipDr.Hussain J. AL-Alkawi. He has a Ph.D. in Mechanical Engineering (Applied Mechanics) from Sheffield University (U.K.-1986). In (1/8/2011), he has been appointed as a chairman of the Electromechanical Systems Engineering Branch in Electromechanical Engineering Department /University of Technology.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 EREE 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 EREE faculty and the EREE 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 Energy and Renewable Energies 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

The operating budget of EREE is satisfactory to meet the department's goals, objectives, and projected outcomes. The decentralized budgeting process allows the department to plan and execute, as it deems appropriate. The ability to manage the department's financial resources on a continuous basis and re-deploy available resources as the needs change insures flexibility and an immediate response to departmental needs.

The Department manages and monitors its own budget, which includes all the operating expenses of the Department and capital equipment for continuous improvement of undergraduate laboratories. The budget is allocated through Ministry of Higher Education and Scientific Research. The University distributed the budget in the various categories after Ministry permission. The categories include; maintenance and repair, functional operations of undergraduate laboratories, over load teaching, educational support, and staff salaries. Capital equipment fund for continuous improvement of undergraduate laboratories is allocated separately by the Ministry, for last five years, **one million dollar** was spent on undergraduate Labs to buy a new devices.

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.

PROGRAM CRITERIA

1. Curriculum

Criteria for Electromechanical System Engineering Program:
Our program satisfy Mechanical and Electrical Engineering programs requirements. For Mechanical Engineering part, our curriculum satisfy ABET Mechanical Engineering criteria:

The curriculum must require students to apply principles of engineering, basic science, and mathematics (including multivariate calculus and differential equations); to model, analyze, design, and realize physical systems, components or processes; and prepare students to work professionally in both thermal and mechanical systems areas.
For Electrical Engineering part, our curriculum satisfy ABET Electrical Engineering criteria:
The curriculum must include applications appropriate to the program name; mathematics through differential and integral calculus; sciences (defined as physical science); and engineering topics (including computing science) necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components.

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 Mechanical and Electrical 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 electromechanical system engineeringproblems.
The faculty requirements of the Mechanical and Electrical Engineering Program Criteria are satisfied by the qualifications of our faculty members, which are described in the section "CRITERION 6