Program Guide

Department of Electrical Engineering
College of Engineering
Najran University

COLLEGE OF ENGINEERING BROCHURE
THE DEAN'S WORD

The Government of the Custodian of the Two Holy Mosques has done all efforts to ensure the welfare of its citizens and placed them in a position among highly civilized and cultural nations.

As a first priority, great efforts have been exerted to propose development plans for the improvement of our beloved kingdom to meet the needs of the citizens. According to the governmental policies, the demands of the developmental plans and the Saudi nationwide renaissance, educational institutions have carried the responsibilities to build, educate and develop the generations who are the bases of development in all fields. As part of them, Najran University has set its plans to graduate qualified students in various fields of knowledge.

College of Engineering, as one of the other fourteen colleges of the University, was established in 1431 AH according to the recommendation of the University Council to meet the needs of Najran Region. In its strategic plan, the college has established six scientific departments. They are: Electrical Engineering, Civil Engineering, Architectural Engineering, Mechanical Engineering, Chemical Engineering, and Industrial Engineering. We are grateful to Allah, that some batches have been graduated from three departments (Electrical Engineering, Civil Engineering and Architectural Engineering).

The College endeavors to provide an integrated learning environment to achieve the plans of its programs which have been built according to the latest international standards and to keep up with the standards of the Saudi National Center for Academic Accreditation and Evaluation (NCAAE) and the American Accreditation Board for Engineering and Technology (ABET)
These have been done through the following:

1- Providing classrooms with the best modern technologies in education to give the student the opportunity of receiving information in more than one way of learning in the classroom. Therefore, students can use the programs of laptops /computers, the applications of tablets and cell devices to synchronize them with the smart projector in the classroom. In addition, they can use other social media applications and E-learning provided by the university.

2 - Preparing laboratories for all departments of the faculty and providing them with the latest international modern equipment that are compatible with advanced engineering technologies.

3 – Recruiting highly qualified academic members.

4 - Establishing research units in engineering sciences and sustainability so that students can enrich their knowledge by receiving additional courses, implementing their graduation projects and keeping up with the new researches in various fields of engineering such as the use of IOT, Energy Efficiency, and Green Buildings.

The College of Engineering at Najran University is aware of the goals of the kingdom 2030 vision, so the faculty has adopted two initiatives that have been accredited by the office of Vision Achievement in the Ministry of Education. They are:

1. Automating the measurement of learning outcomes in university education;
2. Providing dual degree programs in engineering in collaboration with international engineering colleges.

Dean
College of Engineering, Najran University
Abdullah Alwadie, PhD

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INTRODUCTION ABOUT NAJRAN UNIVERSITY

The custodian of the Two Holy Mosques King Abdullah Bin Abdulaziz, may Allah bless him, issued a royal decree of establishing Najran University on Shawaal 10th,1427A.H. during the inauguration ceremony of the University campus.

Najran University is located on the Eastern outskirts of the city of Najran, with an area of 18 million square meters, thus becoming the largest University campus all over the Kingdom. The University will include two campuses for males and females. It consists of 14 and 10 colleges for males and females respectively, with an overall capacity of 45 thousand students. The university will also have a medical city, a research center, a sport and entertainment arenas and accommodation for the faculty and staff members as well as students. There will also be a future investment city to serve as a trust foundation for the university. The investment will include, not exclusively, hotels, commercial centers and private schools.

UNIVERSITY VISION AND MISSION

Vision

The vision of Najran University is for ***"Leadership in teaching, learning, and community service and active contribution to building a society of science and knowledge".***

Mission

Najran University is committed in ***"Offering teaching and learning that address the needs of society and the labor market; effective contribution to sustainable development through conducting applied research and optimal use of modern technologies and establishing partnerships at the local, regional and global levels".***

Strategic Objectives

Najran University has number of strategic objectives to achieve its goal in the field of higher education, listed as follows:

(1) Achieving academic programs that can compete internationally within the framework of Islamic values.
(2) Graduating distinguished students with great efficiency for the future.
(3) Promoting the competencies and efficiency of the teaching staff.
(4) Enhancing and investing in university facilities as well as utilizing new technologies.
(5) Improving learning resources in line with the universal standards.
(6) Providing excellent services and support for students.
(7) Developing the financial and administrative systems according to the total quality standards.
(8) Securing a prosperous professional future for the alumni.

(9) Developing academic research policy to support sustainable development.
(10) Improving Post-graduate programs.
(11) Continuous and effective commitment to community service.
(12) Establishing a framework for national, regional and global cooperation and partnership.

Rules and Regulations

Najran University's regulations are based on the statute and regulations of the Board of Higher Education and Universities, which was approved by the Council of Ministers on 4. 4. 1414 A.H. The statute consists of the following:
-Board of Higher Education Statute.
-Regulations of College Education and Examination.
-Regulations of University Financial Affairs.
-Regulations of Hiring Non-Saudis at Saudi Universities.
-Regulations of Scholarships & Training of University Personnel.
-Unified Regulations of Higher Studies at Saudi Universities.
-Regulations of Saudi Personnel Affairs- Faculties and the Like.
-Regulations of Scientific Research.
-Regulations of Scientific Societies at Saudi Universities.

Process for Students Evaluation

The process of evaluating students' performance in the courses registered by the student in each semester will be conducted by the instructors who are teaching the courses. The instructor evaluates students' performance in each course. The instructor designs the assessments for finding out the attainment of the course learning outcomes specified by the curriculum committee. The instructor may distribute marks on home assignments, quizzes, mid-semester examinations, term project and a final examination to objectively evaluate students' performance, which later will be accumulated over percentage and finally converted into the attainment of the course learning outcomes (CLOs) and student outcomes (SOs) using CLOSO software. In the courses that involve laboratory classes, laboratory performance, written reports (for each experimental work throughout the semester) and the final laboratory examination are used to assess the attainment of the CLOs and SOs. Based on the policy and implementation rules of examinations and grades, EE program has formulated a grading policy that was approved by the departmental council.

Assessment of a course is usually based on the combination of grades awarded to course work (performance throughout the semester) and the final examination. Each course has a total of 100 points. Out of this, the instructor evaluates 50% marks to the course work consisting of quizzes,

homework, term projects and mid-term or other periodic assessments while the remaining 50% is evaluated in the final examination. A grade of "Incomplete" (IC) is given to the student if the course requirements are not fulfilled by the student. This is usually endorsed in courses that require a project to be completed by the student. It is awarded only on the recommendation of the instructor and approval of the Department Council. The student getting IC must fulfill the requirements during the following semester; otherwise the IC is automatically changed to "F".

Najran University requires that students do not miss more than 25% of the total number of lectures, labs, and tutorials. Students failing to meet this requirement in any of the courses are prohibited from appearing in the final examination of that course and earn a DN (Denied) grade in that course. A student who is absent in the final examination of a course(s) for an acceptable reason approved by the department council and the dean of the college, is allowed to take the examination at a later date.

Table 1 shows the grading system of Najran University. The instructor awards the marks out of 100. The marks are converted to a letter grade and grade points according to the following Table 1.

Table 1 Grading System at Electrical Engineering Program in Najran University.

Percentage	**Evaluation**	**Letter Grade**	**Grade Point Average out of 5**
95 – 100	Excellent Plus	A +	5.00
90 to less than 95	Excellent	A	4.75
85 to less than 90	Very Good Plus	B +	4.50
80 to less than 85	Very Good	B	4.00
75 to less than 80	Good Plus	C +	3.50
70 to less than 75	Good	C	3.00
65 to less than 70	Pass plus	D +	2.50
60 to less than 65	Pass	D	2.00
Less than 60	Fail	F	1.00
	Incomplete	IC	-
	Denied	DN	-

At the end of each semester, the instructors submit the grades of all courses through the online grading system (Edugate) that is approved by the department head and dean of college of Engineering. The student's performance and progress are determined by the grade point average (GPA). A sample of student's grade report and the calculated GPA for six (6) subjects in a typical semester is shown in Table 2.

Table 2 Calculated Grade Point Average (GPA).

Course	Credit Hours (CH)	Point Marks out of 100	Letter Grade	Grade points per Credit Hours (GP)	Total Grade Points CH×GP
Course 1	2	90	A	4.75	9.50
Course 2	3	85	B+	4.5	13.5
Course 3	3	78	C+	3.5	10.5
Course 4	3	82	B	4.0	12.0
Course 5	4	77	C+	3.5	14.0
Course 6	2	71	C	3.0	6.0
Total	17				65.5
Computed GPA = Total Grade Points / Total Credit Hours = 65.5/17=3.85					

INTRODUCTION ABOUT ELECTRICAL ENGINEERING DEPARTMENT

The Electrical Engineering Department was established in the year 2008 as one of the major departments of the university and has been actively engaged in teaching in different specialization of Electrical Engineering.

Department offers bachelor degree in Electrical Engineering. Until now, the program is offered for males only. The program is mainly a teaching program until now. Courses in electrical engineering are offered through the College of Engineering. The department produced its first batch of graduates in 2013.

The program gives emphasis mainly on teaching basic skills, theoretical knowledge and practical experiences necessary for practicing the occupation of Electrical Engineering. In addition, Electrical Engineering department assists the students to become familiar with local and global engineering current application trends. In turn, qualified engineers would be graduated with necessary knowledge in Electronics and Communication Engineering, Power and Control engineering.

The department is fully equipped with laboratories that cover all aspects of electrical engineering knowledge. These laboratories are continuously updated to keep pace with the latest technology requirements.

DEPARTMENT'S VISION AND MISSION

Vision

"Leading department in electrical engineering education, applied research and community services."

Mission

Electrical engineering program is committed to:

- ***"Provide students with an accredited Electrical Engineering education of high quality standards.***
- ***Prepare graduates who possess excellent knowledge and strong competent skills, uphold professional attitudes necessary in fulfilling their responsibilities towards the Almighty, society and meet the industry's expectations.***
- ***Conduct high quality applied Electrical Engineering research using the best modern technology.***
- ***Provide innovative solutions for Electrical Engineering problems that contribute to sustainable development.***
- ***Build knowledge based society nationally and internationally."***

The figure 1(a) below shows the organizational chart for College of Engineering and figure 1 (b) shows the organization Flow chart for Electrical Engineering department.

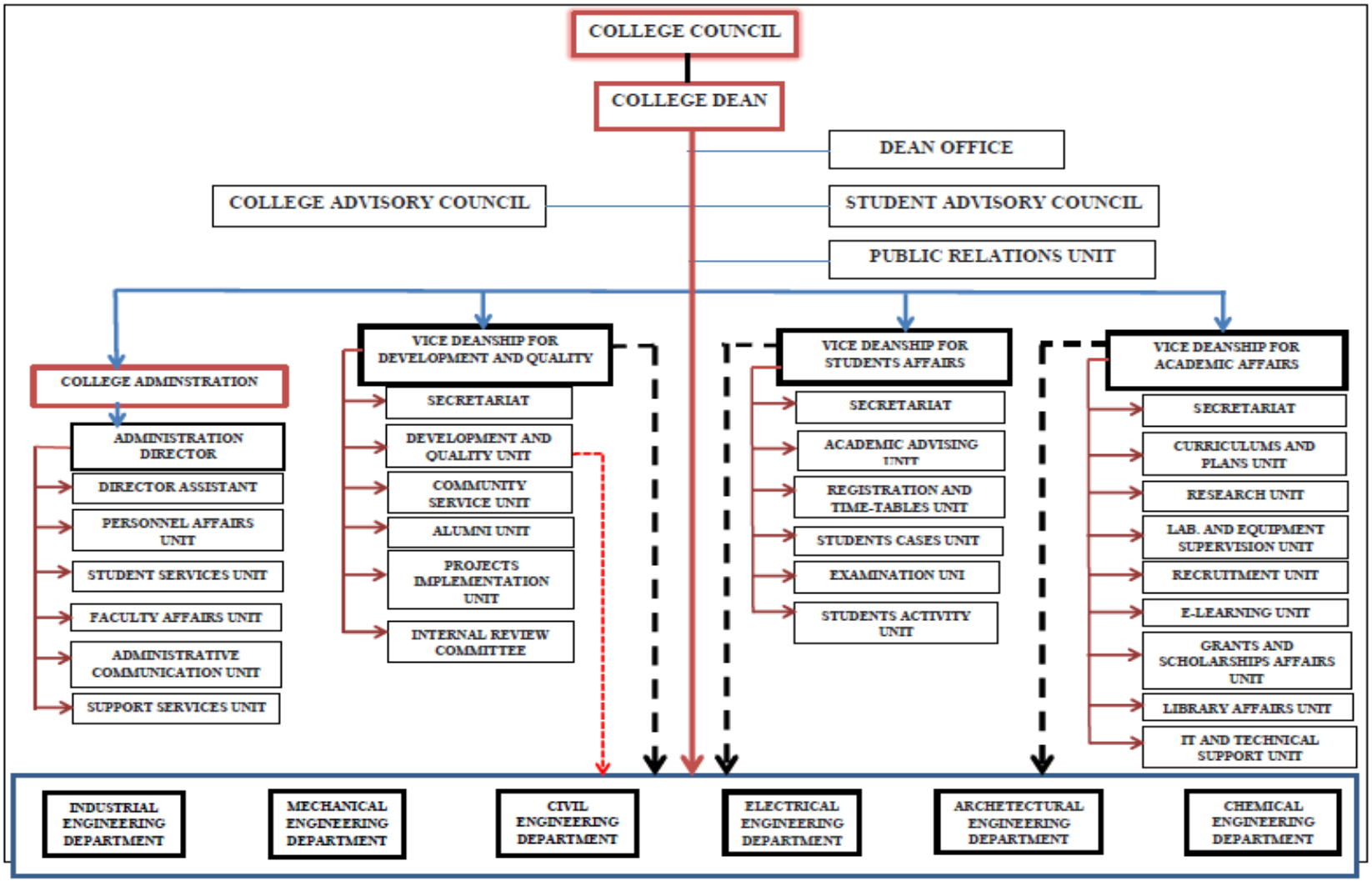


Figure 1 (a): Flow chart for college of engineering

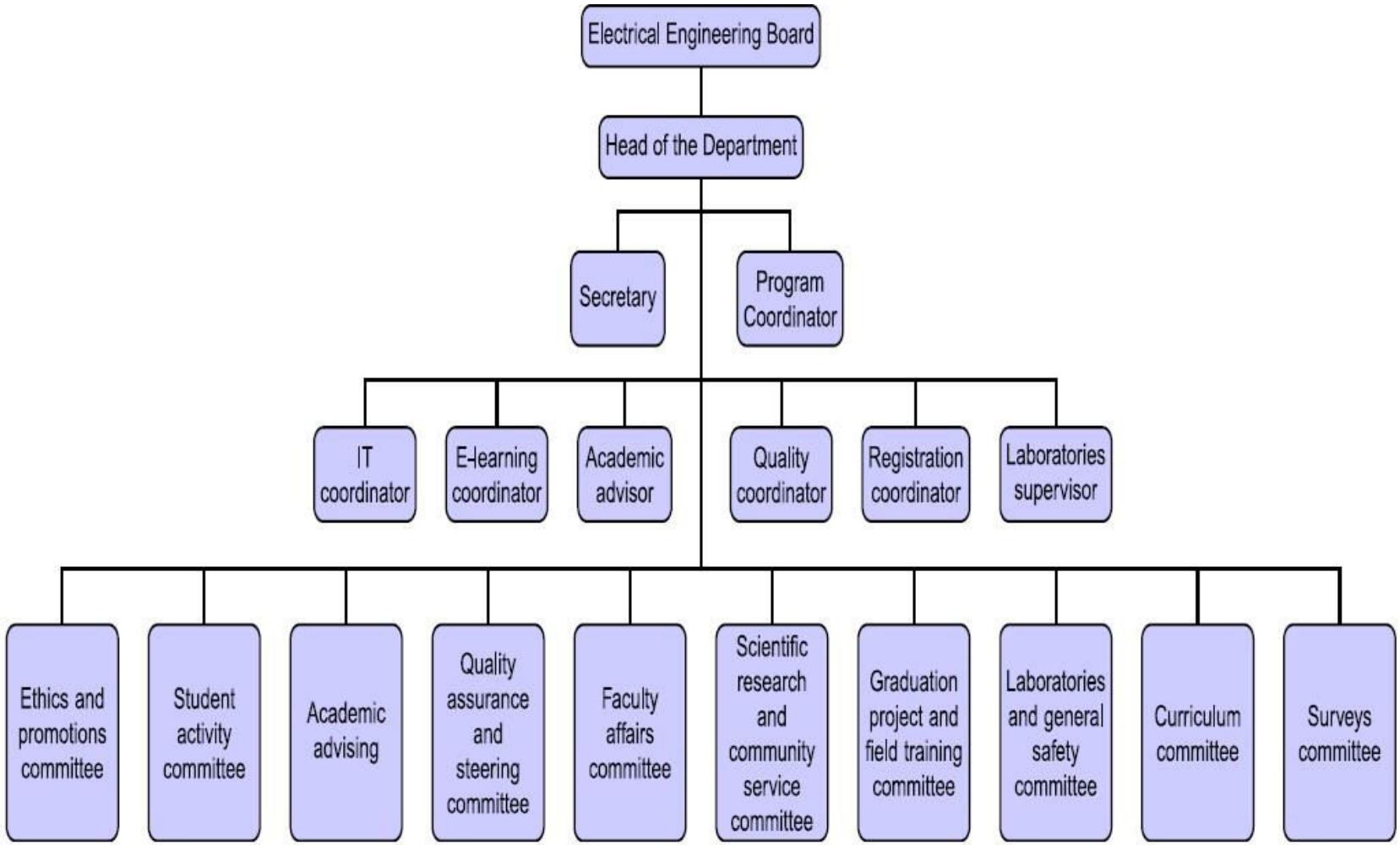


Figure 1 (b): Organization Flow chart for Electrical engineering

Library Services

The University library (Prince Mesha'al Library) is centrally located within the University campus. Its current collections of monographs and bound periodicals exceed 310,000 volumes from more than 300 publishers. The collection is comprised of 80% in Science and Engineering and 20% in Humanities and Social Sciences. The library subscribes to 1,264 periodical titles and 1,249 electronic journals too. It also maintains 37,522 reels of journal earlier issues on microfilm. The current collection for the Electrical Engineering is 21,336 books and bound periodicals. The periodical subscription is for 26 titles. This is in addition to the subscription of the IEEE/IEE Electronic Library full-text database. This permits the user access to 1400 publications, starting from 1988 and including more than 100 technical journals, over 600 IEEE/IEE standards and about 700 Electrical Engineering conferences. The services offered by the library are summarized below:

- *Online Searching:*

The NU Library has online access through the internet to more than 600 international databases covering humanities, social sciences, sciences and engineering.

Figure 2: NU Library view

- *Book Loans and Reading in the Library:*

In addition to the online searching and use of international databases, instructors and students can go directly to the central library and order their books. Besides the central library, we have another departmental library for the Department of Electrical Engineering from which the instructors can easily make their loans of specialized content.

Figure 3: Sitting arrangements and view of books on shelf in Library

PROGRAM OFFERED

The Department offers Bachelor of Electrical Engineering after completion of 132 credit hours along with non-credit summer training.

Program Objectives

The graduates of EE program are prepared to achieve the following program objectives:

1. Technically compete in their respective Electrical Engineering field and conceiving, designing and executing broad range of Electrical Engineering tasks locally and globally.
2. Meet industry's expectations in Electrical Engineering with excellent communication and leadership skills.
3. Contribute to the society through providing innovative solutions for Electrical Engineering problems and function on multi-disciplinary teams.
4. Pursue their Electrical Engineering professional development through self-learning and advanced graduate studies if qualified and interested.
5. Uphold professional and social ethics necessary in fulfilling their responsibilities towards the Almighty, clients and the society and contribute to sustainable development of the Kingdom.

Program Outcomes

1. Identify and apply knowledge of mathematics and sciences and engineering in Electrical Engineering problems.

2. Design and conduct experiments, as well as to analyse and interpret data required for solving Electrical Engineering projects.
3. Design an optimum Electrical Engineering system/component to meet desired needs with realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Function effectively on multi-disciplinary electrical engineering teams.
5. Identify, formulate, and solve Electrical Engineering problems and to evaluate and synthesize information in order to provide best alternative solutions.
6. Act professionally and ethically and recognize the impact of liability issues in Electrical Engineering projects.
7. Communicate effectively, prepare professionally written materials, graphical communications, and deliver professional oral and written presentations.
8. Recognize the broad education necessary to understand the impact of engineering solutions in economic, environmental and societal context, and to improve the quality of life.
9. Recognize the need for and an ability to engage in life-long learning and continuing education of professional/engineering skills.
10. Recognize the contemporary issues in Electrical Engineering disciplines.
11. Use techniques, skills, and modern engineering tools necessary for Electrical Engineering practices.

The Academic Plan

The academic plan of Electrical Engineering program is shown in Table 3. Students admitted to Electrical Engineering program complete the first two semesters (level 1 and level 2) in the preparatory year program which consists of 27 credit hours including 6 credit hours in math courses, in addition to other courses. The course curriculum of Electrical Engineering program is shown in Figure 6. The curriculum consists of 132 credit hours. The curriculum covers 6 courses as general education, which is in total 12 credit hours. These Arabic language and Islamic studies courses are required by the university. Two courses with 5 credit hours are on communication skills (English language courses). The study plan includes 9 courses of 29 credit hours on math and basic sciences. These courses cover four basic science, such as, mathematics, physics, chemistry and geological science. These features completely fit the requirements of electrical engineering program of ABET. The curriculum also includes 31 courses of 86 credit hours on core electrical engineering. In addition, there is one course on summer field training of zero credit hours.

A flowchart that illustrates the prerequisite structure of the Electrical Engineering program is shown in figure 4 below.

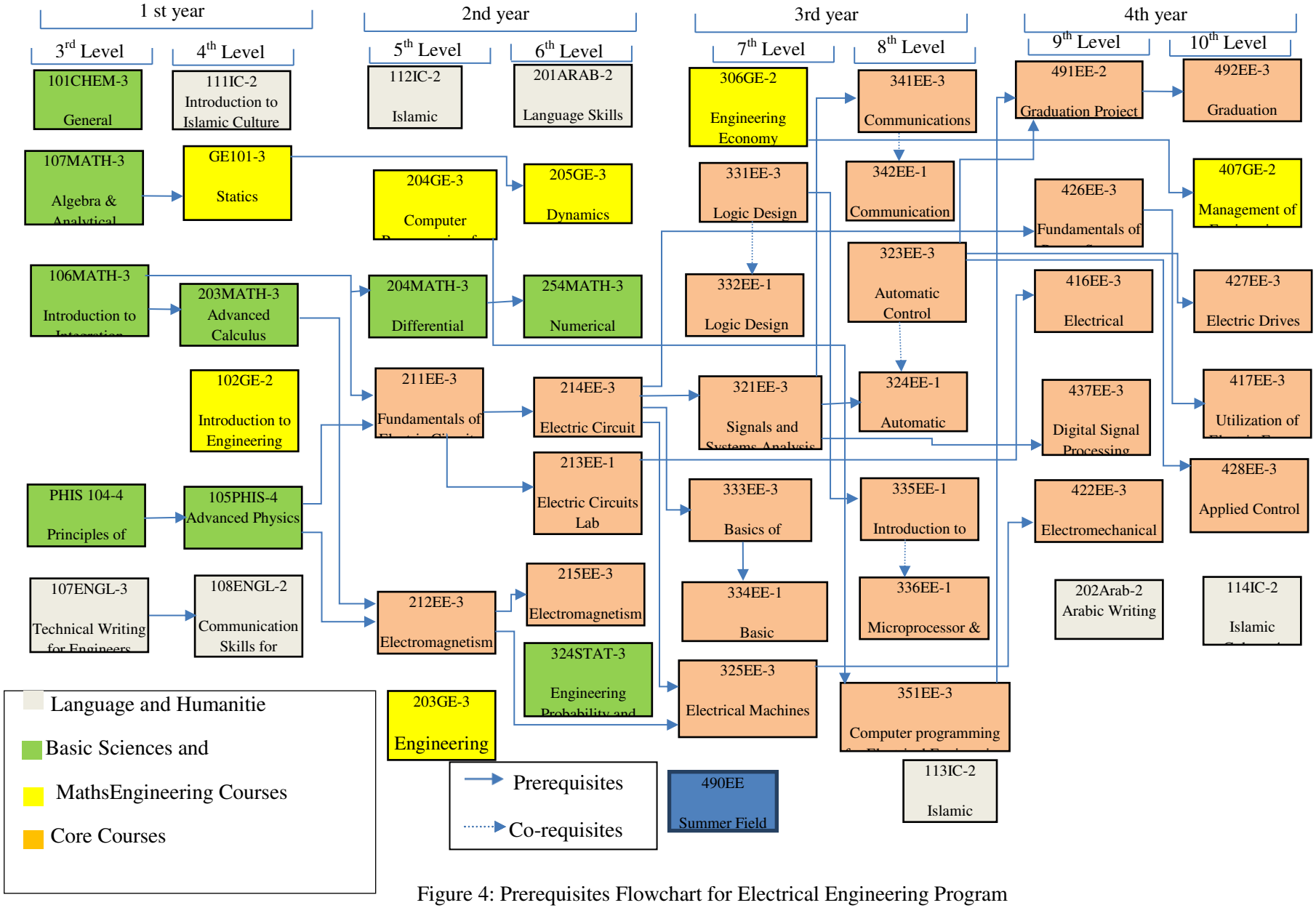


Figure 4: Prerequisites Flowchart for Electrical Engineering Program

Table 3 Curriculum of Electrical Engineering Program

No.	Curriculum Component		No. of Courses	No. of Credit Hours
1.	University Requirement Courses		6	12
2.	Faculty Requirements	Communication Skills	2	5
		Math and Science	9	29
		General Engineering	7	18
3.	Department Requirements		24	68
4.	Cooperative Field Training		1	0
Total			49	132

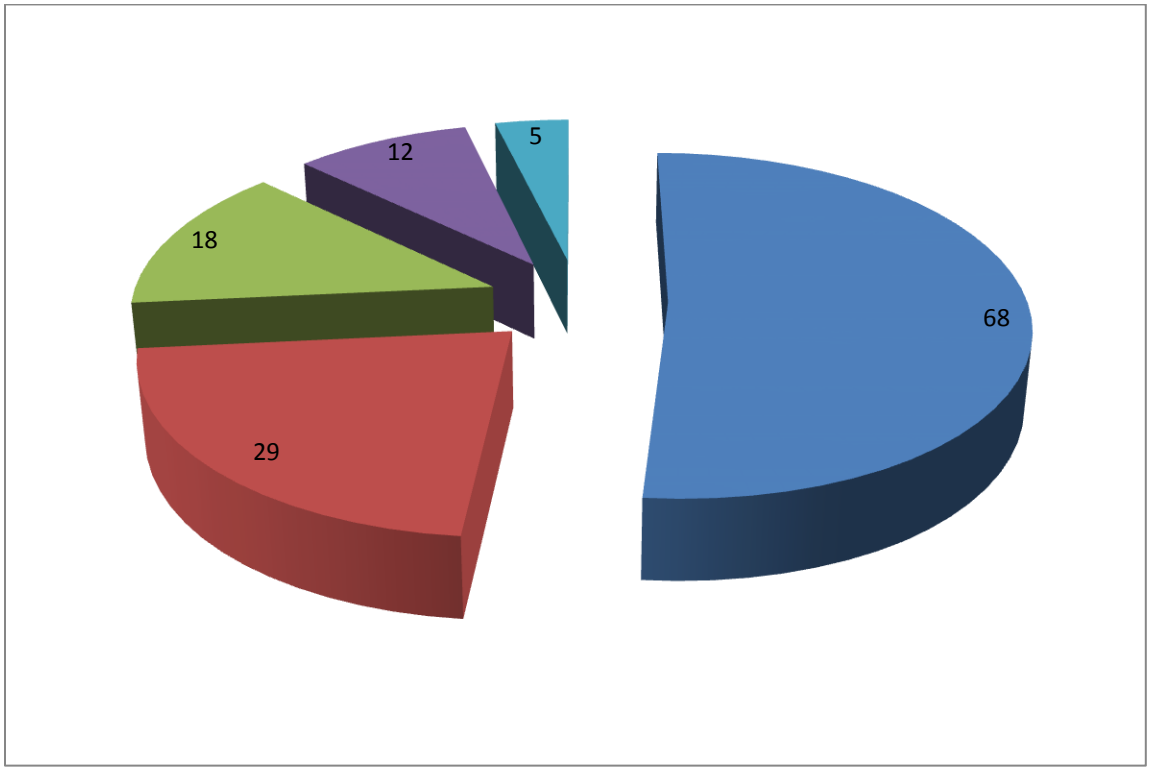


Figure 5 Credit Hours Distribution of Electrical Curriculum

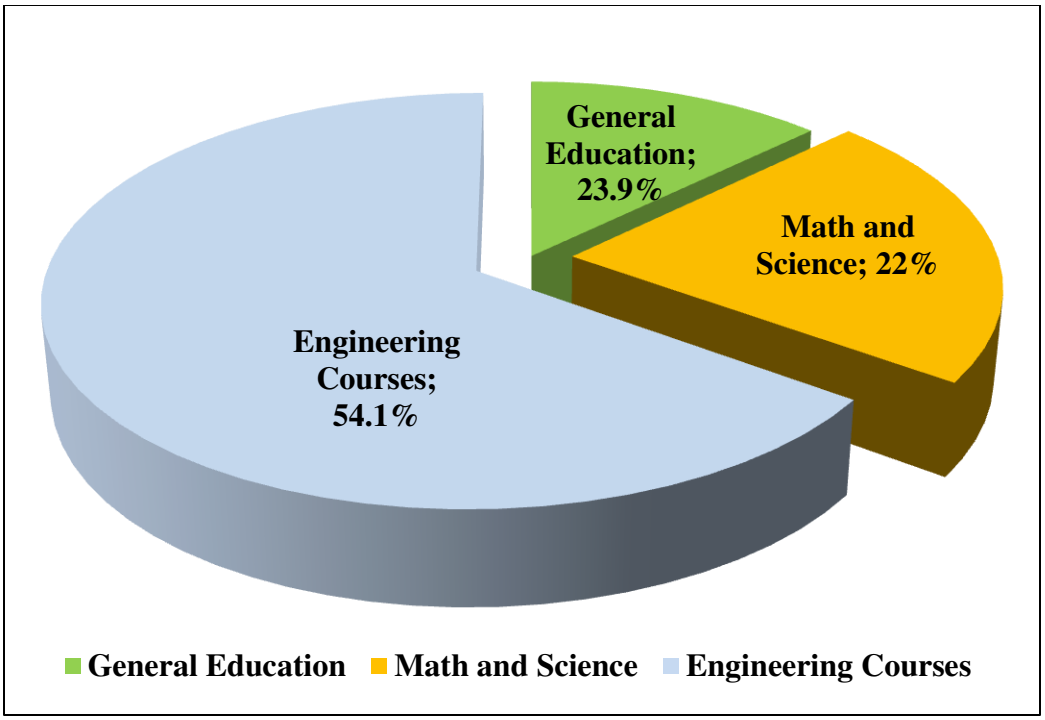


Figure 6 Distribution of Electrical Curriculum in Percentage

Table 4. General University Requirements

Prep. Year			
No.	**Course Code**	**Course Title**	**Credit Hours CR (Theory, Lab, Tut.)**
1.	140TEC-3	Computer Skills	3 (3 , 0 , 0)
2.	140MATH-2	Introduction of Mathematics	2 (2 , 0 , 0)
3.	140SKL-2	Learning, Thinking and Research Skills	2 (2 , 0 , 0)
4.	140ENGG-2	English Language :Reading Skills	2 (2 , 0 , 0)
5.	141ENGG-2	English Language :Writing Skills	2 (2 , 0 , 0)
6.	142ENGG-2	English Language :Listening and Speaking Skills	2 (2 , 0 , 0)
7.	143ENGG-2	English Language :Grammars	2 (2 , 0 , 0)
8.	150MAN-1	Occupational Ethics	1 (1 , 0 , 0)
9.	150MATH-4	Algebraic Sciences	4 (4 , 0 , 0)
10.	150SKL-2	Communication Skills	2 (2 , 0 , 0)
11.	150ENGG-3	English Language: Speaking	3 (3 , 0 , 0)
12.	151ENGG-2	Report Writing	2 (2 , 0 , 0)
	Total		27(27 , 0 , 0)
University Requirements			
No.	**Course Code**	**Course Title**	**Credit Hours CR(Theory,Lab,Tut.)**
1.	111ISL-2	Introduction to Islamic Culture 1	2 (2 , 0 , 2)
2.	112ISL-2	Introduction to Islamic Culture 2	2 (2 , 0 , 2)

3.	201ARAB-2	Arabic Language Skills	2 (2 , 0 , 0)
4.	113ISL-2	Islamic Culture (3)	2 (2 , 0 , 2)
5.	202ARAB-2	Arabic Writing	2 (2 , 0 , 0)
6.	114ISL-2	Islamic Culture (4)	2 (2 , 0 , 2)
	Total		12 (12, 0, 8)
Faculty Requirements			
No.	**Course Code**	**Course Title**	**Credit Hours CR(Theory,Lab,Tut.)**
1.	107ENG-3	Technical Writing	3 (3 , 0 , 1)
2.	108ENG-2	Communication Skills for Engineers	2 (2 , 0 , 1)
	Sub Total		5 (5 , 0 , 2)
Math and Science			
No.	**Course Code**	**Course Title**	**Credit Hours CR(Theory,Lab,Tut.)**
1.	101CHM-3	General Chemistry	3 (3 , 0 , 1)
2.	104PHIS-4	Principles of Physics	4 (3 , 2 , 1)
3.	106MATH-3	Introduction to Integration	3 (3 , 0 , 1)
4.	107MATH-3	Algebra & Analytical Geometry	3 (3 , 0 , 1)
5.	203MATH-3	Advanced Calculus	3 (3 , 0 , 1)
6.	105PHIS-4	Advanced Physics	4 (3 , 2 , 1)
7.	204MATH-3	Differential Equations	3 (3 , 0 , 1)
8.	324STAT-3	Probabilities and Engineering Statistics	3 (3 , 0 , 1)
9.	254MATH-3	Numerical Methods	3 (3 , 0 , 1)
	Sub Total		29 (27, 4 , 9)
General Engineering			
No.	**Course Code**	**Course Title**	**Credit Hours CR(Theory,Lab,Tut.)**
1.	101GE-3	Statics	3 (3 , 0 , 1)
2.	102GE-2	Introduction to Engineering Design	2 (2 , 0 , 1)
3.	203GE-3	Engineering Drawing	3 (1 , 4 , 1)
4.	205GE-3	Dynamics	3 (3 , 0 , 1)
5.	306GE-2	Engineering Economy	2 (2 , 0 , 1)
6.	407GE-2	Management of Engineering Projects	2 (2 , 0 , 1)
7.	204GE-3	Computer Programming for Engineers	3 (2 , 2 , 0)
	Sub Total		18 (15 , 6 , 6)
	Grand Total		52 (47 , 10 , 24)
Department Requirements (Core Course)			
No.	**Course Code**	**Course Title**	**Credit Hours CR(Theory,Lab,Tut.)**
1.	211EE-3	Fundamentals of Electric Circuits	3 (3 , 0 , 1)
2.	212EE-3	Electromagnetism (1)	3 (3 , 0 , 1)
3.	213EE-3	Electric Circuits Lab	1 (0 , 2 , 0)

4.	214EE-3	Electric Circuit Analysis	3 (3 , 0 , 1)
5.	215EE-3	Electromagnetism (2)	3 (3 , 0 , 1)
6.	331EE-3	Logic Design	3 (3 , 0 , 1)
7.	332EE-3	Logic Design Laboratory	1 (0 , 2 , 0)
8.	321EE-3	Signals and Systems Analysis	3 (3 , 0 , 1)
9.	333EE-3	Basics of Electronic Devices	3 (3 , 0 , 1)
10.	334EE-3	Basic Electronics Laboratory	1 (0 , 2 , 0)
11.	325EE-3	Electrical Machines	3 (3 , 0 , 1)
12.	341EE-3	Communications Principles	3 (3 , 0 , 1)
13.	342EE-3	Communications Lab	1 (0 , 2 , 0)
14.	323EE-3	Automatic Control	3 (3 , 0 , 1)
15.	324EE-3	Automatic Control Lab	1 (0 , 2 , 0)
16.	335EE-3	Introduction to Microprocessors	3 (3 , 0 , 1)
17.	336EE-3	Microprocessor and Microcontroller Lab	1 (0 , 2 , 0)
18.	351EE-3	Computer Programming for Electrical Engineering	3 (2 , 2 , 0)
19.	426EE-3	Fundamentals of Power Systems	3 (3 , 0 , 1)
20.	416EE-3	Electrical Measurements	3 (3 , 0 , 1)
21.	437EE-3	Digital Signal Processing	3 (3 , 0 , 1)
22.	422EE-3	Electromechanical Energy Conversion	3 (3 , 0 , 1)
23.	427EE-3	Electric Drives	3 (3 , 0 , 1)
24.	417EE-3	Utilization of Electric Energy	3 (3 , 0 , 1)
25.	428EE-3	Applied Control	3 (3 , 0 , 1)
26.	491EE-2	Graduation Project I	2 (1 , 2 , 0)
27.	492EE-3	Graduation Project II	3 (1, 4 , 0)
27	Sub Total		68 (58 , 20 , 18)
1	490 EE-0	Cooperation Field Training	0 (0 , 0 , 0)

Table 5. Study Plan for Electrical Engineering Program per Semester

1st Year: Preparatory			
1st Semester			
Course #	**Course Title**	**Credits**	**Pre- Requisite**
140 TECH-3	Computer Skills	3	….
140 MATH-2	Introduction of Mathematics	2	….
140 SKL-2	Learning, Thinking and Research Skills	2	….
140 ENGL-2	English Language: Reading Skills	2	….
141 ENGL-2	English Language: Writing Skills	2	….
142 ENGL-2	English Language: Listening and Speaking Skills	2	….
143 ENGL-2	English Language: Grammars	2	….
	Total Credits	**15**	
2nd Semester			
Course #	**Course Title**	**Credits**	**Pre- Requisite**
150 MAN-1	Occupational Ethics	1	….
150 MATH-4	Algebraic Sciences	4	….
150 SKL-2	Communication Skills	2	….
150 ENGL-3	English Language: Speaking	3	….
151 ENGL-2	Report Writing	2	….
	Total Credits	12	

2nd Year			
1st Semester			
Course #	**Course Title**	**Credits**	**Pre- Requisite**
104PHYS-4	Principles of General Physics	4	--
101CHEM-3	General Chemistry	3	--
106MATH-3	Introduction to Integration	3	--
107MATH-3	Algebra & Analytical Geometry	3	--
107ENG-3	Technical Writing for Engineers	3	--
	Total Credits	**16**	
2nd Semester			
Course #	**Course Title**	**Credits**	**Pre- Requisite**
111ISL-2	Introduction to Islamic Culture 1	2	--
101GE-3	Statics	3	107MATH-3
102GE-2	Introduction to Engineering Design	2	--
203MATH-3	Advanced Calculus	3	106MATH-3
108ENG-2	Communication Skills for Engineers	2	107ENG-3
105PHYS-4	Advanced Physics	4	104PHYS-3
	Total Credits	**16**	
3rdYear			
1st Semester			
Course #	**Course Title**	**Credits**	**Pre- Requisite**
112ISL-2	Introduction to Islamic Culture 2	2	--

204GE-3	Computer Programming for Engineers	3	--
204MATH-3	Differential Equations	3	106MATH-3
211EE-3	Fundamentals of Electric Circuits	3	106MATH-3 105PHY-4
212EE-3	Electromagnetism (1)	3	203Math-3 105PHY-4
203GE-3	Engineering Drawing	3	--
	Total Credits	**17**	

2nd Semester			
Course #	**Course Title**	**Credits**	**Pre- Requisite**
201ARAB-2	Arabic Language Skills	2	--
205GE-3	Dynamics	3	101GE-3
254MATH-3	Numerical Methods	3	204MATH-3
214EE-3	Electric Circuit Analysis	3	211EE-3
215EE-3	Electromagnetism (2)	3	212EE-3
213EE-1	Electric Circuits Lab	1	211EE-3
324STAT-3	Engineering Statistics & Probability	3	--
	Total Credits	**18**	

4thYear			
1st Semester			
Course #	**Course Title**	**Credits**	**Pre- Requisite**
306GE2	Engineering Economy	2	--
331EE-3	Logic Design	3	--
332EE-1	Logic Design Laboratory	1	331EE-3
321EE-3	Signals and Systems Analysis	3	214EE-3
333EE-3	Basics of Electronic Devices	3	214EE-3
334EE-1	Basic Electronics Laboratory	1	333EE-3
325EE-3	Electrical Machines	3	212EE-3, 214EE-3
	Total Credits	**16**	

2nd Semester			
Course #	**Course Title**	**Credits**	**Pre- Requisite**
341EE-3	Communications Principles	3	321EE-3
342EE-1	Communications Lab	1	341EE-3
323EE-3	Automatic Control	3	321EE-3
324EE-1	Automatic Control Lab	1	323EE-3
335EE-3	Introduction to Microprocessors	3	331EE-3
336EE-1	Microprocessor and Microcontroller Lab	1	335EE-3
351EE-3	Computer programming for Electrical Engineering	3	204GE-3
113ISL-2	Islamic Culture 3	2	--
490EE-0	Summer Field Training (*)		Minimum credit hour achieved before training is 90.
	Total Credits	**17**	

5thYear			
1st Semester			
Course #	**Course Title**	**Credits**	**Pre- Requisite**
202ARAB-2	Arabic Writing	2	
416EE-3	Electrical measurements	3	213EE-1
422EE-3	Electromechanical Energy Conversion	3	325EE-3
426EE-3	Fundamentals of Power Systems	3	214EE-3
437EE-3	Digital Signal Processing	3	321EE-3
491EE-2	Graduation Project I	2	335EE-3
	Total Credits	**16**	
2nd Semester			
Course #	**Course Title**	**Credits**	**Pre- Requisite**
114ISL-2	Islamic Culture 4	2	
407GE-2	Management of Engineering Projects	2	306GE-2
417EE-3	Utilization of Electric Energy	3	426EE-3
427EE-3	Electric Drives	3	323EE-3
428EE-3	Applied Control	3	323EE-3
492EE-3	Graduation Project II	3	491 EE-3
	Total Credits	**16**	

General University Course Description

104PHYS-4 Principles of General Physics **4 (3,2,1)**

Vectors, Newton's Laws of Motion, Work and Energy, properties of matter, and their flow, principles of heat, Static and Dynamic electricity, Sound and Optics.

101CHEM-3 General Chemistry **3 (3,0,1)**

Stoichiometry Chemical Arithmetic. Gaseous state - The liquid state – Solutions - properties of the combined solutions - Chemical equilibrium - Introduction to organic chemistry: History of organic chemistry, Chemistry of carbons, homologes series, functional groups, Hydrocarbons.

106MATH-3 Integral Calculus **3 (3,0,1)**

Integration: indefinite integral (definition, geometric meaning, basic properties). Techniques of integral: integration by parts, trigonometric substitutions, partial fractions, quadratic expressions etc . Integration of certain classes of trigonometric functions. Definite integral: Riemann integral - Upper and lower sums, geometric meaning of definite integral, some properties of definite integral. Intermediate value theorem for integrals. Fundamental theorem of Calculus. Applications of the definite integral: area, volume, work, arc length. Approximations by the Trapezoidal and Simpson rules.

107MATH-3 Algebra & Analytical Geometry 3 (3,0,1)

Systems of linear equations, matrices, types of matrices, algebraic of matrices, inverse of matrices, determinants, Cramer's rule. Vectors in two and three dimensions and properties of vectors, scalar (dot) and cross products. Distance formula, gradient (or slope), positive and negative slopes, Inclination, parallel and perpendicular lines, straight line general formula, perpendicular distance from a point to a line, the general formula of circle. Conic sections: the parabola, the ellipse, the hyperbola. Rectangular, polar and spherical coordinates; curves in polar coordinates. Equations of lines and planes in space, surfaces.

107ENG-3 Technical Writing for Engineers 3 (3.0,1)

Provide English Language instruction to enhance students' proficiency and enable them to understand the technical language offered in English as a medium of instruction. Build students' confidence and motivation through exposure to the technical language. Expose students to wide range of topics. Build knowledge of key vocabulary in their relevant field.

203MATH-3 Advanced Calculus 3 (3,0,1)

Infinite Sequences, Infinite series, convergence and divergence of infinite series, integral test, ratio test, root test and comparison test. Conditional convergence and absolute convergence, alternating series test. Power Series, Taylor and Maclaurin series, Vector valued functions, their limits, continuity, derivatives and integrals. Motion of particle in space, tangential and normal components of acceleration. Function in two or three variables, their limits, continuity, partial derivatives, chain Rule, directional derivatives, tangent planes and normal lines to equations, Extrema of Functions of Several Variables, Lagrange Multipliers, Double integral and its applications to area, volume, moments and center of mass. Double integrals in polar coordinates, triple integral in rectangular, cylindrical and spherical coordinates and applications to volume, the moment and center of mass. Vector fields, line integrals, surface integrals, Green's theorem, and the divergence theorem. Stoke's theorem.

Prerequisites: 106Math-3

108ENG-2 Communication Skills for Engineers 2 (2,0,1)

Provide English Language instruction to enhance students' proficiency and enable them to understand the technical language offered in English as a medium of instruction.

Build students' confidence and motivation through exposure to the technical language. Expose students to wide range of topics. Build knowledge of key vocabulary in their relevant field.

Prerequisites: 107ENG

105PHYS-4 Advanced Physics **4 (3,2,1)**

Atomic structure: electronics configuration, classification of elements, energy levels. Crystal structure: lattice, symmetry, space group, examples for simple structure. Electrical properties of materials and electricity: classification of materials. Magnetic properties of materials and magnetism. Thermal properties of materials: thermal energy, thermoelectric power (Seebeck Effect). Mechanical properties of matter (Young's modulus, tensile materials).

The experiments required for 105 Phys. (Advanced physics):

1. Decay of current in a RC circuit
2. LCR circuit.
3. Amplifiers;
4. Cicuit in series and in parallel (with Ohm's law).
5. Solar cell
6. Stefan-Boltzman's law
7. Magnetic field along the axis of coils
8. Thermal properties materials
9. Spring Constant (Hook's law).

Prerequisites: 104 PHIS -4

204MATH-3 Differential Equations **3 (3,0,1)**

The course introduces basic concepts, theorems and knowledge of the linear algebra of matrices, special functions, Fourier analysis and partial differential equations with application to engineering problems. Matrices and Vectors, linear system of equations (Gauss Eliminations) - Determinates, Crammer rule, inverse of matrix Gauss, Jordan elimination - Introduction to vector differential calculus, Dot product and Cross product - Vector differential calculus, Gradient, Divergence and Curl of a vector field) - Special function, Gamma function, Beta function - Introduction to Fourier analysis, Fourier series, Fourier sine series, Fourier cosine series - Partial differential equations, Classifications and methods of solution, heat equation, wave and potential equation.

Prerequisites: 106 Math-3

254MATH-3 Numerical Methods **3 (3,0,0)**

Types of errors, errors analysis. Numerical solutions of nonlinear equations of single variables: fixed point iteration method, bisection method, false position method, Newton-Raphson method, secant method. Numerical solutions of a system of linear equations: Gauss Jordon iterative method. Gauss-Jordon iterative method with partial and complete pivoting. Interpolation: Lagrange interpolation formula, divided differences, Newton interpolation, Numerical

differentiation. Numerical integration. Introduction to numerical solutions of ordinary differential equations.

Prerequisites: 204Math-3

324STAT-3 Engineering Statistics and Probability 3 (3,0,1)

Concepts of statistics and its applications in science and engineering, measure of central tendency, measure of dispersion, regression, correlation, and their applications. Concepts of probability and its applications in science and engineering, probability axioms, conditional probability, independent probability for events, some probability distributions and random variables: discrete and continuous random variables, distributions for applications in engineering such as Poison and Weibull distributions and other probability distributions are important for engineers, time series, and computer applications using statistical software.

111ISL-2 Introduction to Islamic Culture 2 (2,0,2)

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well-known Islamic references. The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community.

112ISL-2 Islamic Culture 2 2 (2,0,2)

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well-known Islamic references. The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community.

201ARAB-2 Language Skills 2 (2,0,0)

تعريف الكلمة: لغة واصطلاحا. أقسام الكلمة: اسم، وفعل، وحرف. علامات الاسم: (أل) التعريف، التنوين، والحديث عنه. أقسام الاسم من حيث الإعراب والبناء: معرب، ومبني. أقسام الفعل: ماض، وأمر، ومضارع. العلامة التي يعرف بها كل فعل،

وحكمه من حيث الإعراب والبناء. تعريف الكلام. صور ائتلاف الكلام ست. تعريف الإعراب، وبيان أنواعه، مع بيان ما يشترك فيه الاسم والفعل، وما يختص به كل واحد منهما، وبيان العلامات الأصول والفروع. مما خرج عن الأصل في إعرابه سبعة أبواب:

خمسة في الأسماء:
الأسماء الستة، المثنى وما ألحق به، جمع المذكر السالم وما ألحق به، الجمع بالألف والتاء المزيدتين وما ألحق به في حالة النصب، الممنوع من الصرف في حالة الجر.

واثنان في الأفعال:
الأفعال الخمسة، الفعل المضارع المعتل الاخر في حالة الجزم. الصرف: الميزان الصرفي – المجرد والمزيد. المعاجم: طريقة الكشف في المعاجم العربية المختلفة. الأدب والنصوص: من القرآن لكريم سورة الحجرات من أولها إلى آخر الآية رقم (12)

من الحديث الشريف: خطبة الوداع، أو بعض الأحاديث المختارة ذات التوجيه الاجتماعي والسلوكي. من الشعر والنثر: مختارات شعرية ونثرية تمثل الأدب العربي.

113ISL-2 Islamic Culture 3 **2 (2,0,2)**

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well-known Islamic references. The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community.

202ARAB-2 Arabic Writing **2 (2,0,0)**

اصطلاحا. أقسام الكلمة: اسم، وفعل. وحرف تعريف الكلمة: لغة،

عالمات االسم :)ال(التعريف، التنوين، والحديث عنه. أقسام االسم من حيث اإلعراب والبناء :معرب، ومبني. أقسام الفعل : ماض، وأمر، ومضارع .العالمة التي يعرف بها كل فعل، وحكمه من حيث اإلعراب والبناء .تعريف الكالم .صور ائتالف الكالم ست .تعريف االعراب، وبيان أنواعه، مع بيان ما يشترك فيه االسم والفعل، وما يختص به كل واحد منهما، وبيان العالمات االصول والفروع. مما خرج عن االصل في إعرابه سبعة أبواب :خمسة في االسماء االسماء الستة المثنى وما ألحق به جمع المذكر السالم وما ألحق به الجمع باألف والتاء المزيدتين وما ألحق به في حالة النصب الممنوع من الصرف في حالة الجر . واثنان في االفعال :االفعال الخمسة الفعل المضارع المعتل االخر في حالة الجزم .الصرف : الميزان الصرفي المجرد والمزيد – المعاجم : طريقة الكشف في المعاجم العربية المختلفة .االدب والنصوص : من القرآن الكريم سورة الحجرات من أولها إلى آخر االية رقم 22 من الحديث الشريف : خطبة الوداع، أو بعض االحاديث المختارة ذات التوجيه االجتماعي والسلوكي .من الشعر والنثر : مختارات شعرية ونثرية تمثل االدب العربي.

114ISL-2 Islamic Culture 4 **2 (2,0,2)**

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well-known Islamic references. The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community

College Courses Descriptions

101GE-3 Statics **3 (3,0,1)**

Basic concepts and principles of statics. Vector operations. Equilibrium of particles in two and three dimensions. definition of moment and couple; reduction of systems forces; equilibrium of rigid bodies; statically determinate structures including beams, trusses, frames, and machines; internal forces; shear force and bending moment diagrams in beams; friction and its applications, centroid and center of gravity of lines, areas, and volumes; moment of inertia and radius of gyration.

Prerequisites: 107Math-3

102GE-2 Introduction to Engineering Design **2 (2,0,1)**

Introduction to active learning, teamwork, team dynamics, team norms and communication, conducting effects meetings and quality assessment. Understanding the seven habits of highly qualified professionals. Organization of work and design notebook. Reverse engineering and design project. Computer modeling and heuristics for solving problems, stochastic process, optimization and expert systems. Schedule and time management.

204GE-3 Computer Programming for Engineers **3 (2,2,0)**

Computer Algorithms; Developing Algorithms; Programming Preliminaries; Simple computer Programs; Numeric Constants and Variables; Arithmetic Expressions; Input and Output in C Programs; Conditional statements; Implementing loops in Programs; Defining and Manipulation Arrays; Logical Expressions and More Control statements; C Programs Examples; Functions;

Enumerated data Type and stacks; Structures; Pointer Data Type and its Applications; Lists and Trees; Recursion; Bit level Operations and Applications;

203GE-3 Engineering Drawing **3 (1,4,1)**

Introduction to drawing, Drawing equipment and use, Skills of Freehand Sketching, Methods of Projection: Orthographic, Isometric Dimensioning of View. Third View Prediction, Primary and Successive Auxiliary Views. Intersections of Surfaces and Bodies. Development of Surfaces. Sectioning. Introduction to Assembly Drawings. Introduction to computer graphics, Engineering Applications.

205GE-3 Dynamics **3 (3,0,1)**

Basic considerations (Vector operations, Newtonian mechanics), Engineering applications of virtual work, Kinematics of particles, Newton's law, Equations of motion, Work and energy, Impulse momentum, and vibrations.

Prerequisites: 101GE-3 Static

306GE-2 Engineering Economy **2 (2,0,1)**

Introduction to Engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects. Basic management process approach, strategies and planning methods, project planning and scheduling, Bar chart, critical path methods, PERT method, resource leveling and allocation, time cost trade off. Construction and organizational approaches, leadership elements and decision-making, computer applications.

407GE-2 Management of Engineering Projects **2 (2,0,1)**

Characteristics of Construction Industry; project delivery systems; the design and construction process; construction contracting; construction planning; project control, conceptual cost estimation; and Quality and Safety Management.

Prerequisites: 306GE-2

Departmental Course Descriptions

211EE-3 Fundamentals of Electric Circuits **3 (3,0,1)**

Basic circuit elements and concepts; Basic laws of circuit theory: Ohm's law, Kirchoff's law; Circuit theorems: superposition principle, Thevenin and Norton theorems; maximum power transfer theorem Techniques of circuit analysis: Nodal and mesh analysis; Sinusoidal sources and the concept of phasor in circuit analysis; Introduction to concept of average, reactive, complex power and power factor.

Pre-requisite: 106 MATH-3 and 105PHYS-4.

213EE-1 Electric Circuits Laboratory **1 (0,2,0)**

General introduction to the laboratory Voltage, current, and power in DC circuits using KVL and KCL. Superposition, Thevenin's, and Maximum power transfer theorems in DC circuits; Series and parallel AC circuits; Resonance in series and parallel circuit; Maximum power transfer theorem and power factor improvement in AC circuits; Transients in DC circuits; Magnetically-coupled circuits; Three phase circuits.

212EE-3 Electromagnetism (I) **3 (3,0,1)**

Review to vector calculus; Electrostatic fields; Gauss's law and divergence; Electric potential; Dielectrics and capacitance; Poisson's and Laplace's equations; Charge images; Current density and conductors; Magnetostatic fields; Biot–Savart and Ampere's laws; Curl and Stoke's theorem; Magnetic materials and circuits; Self and mutual inductances; Energy in static Fields.

Pre-requisite: 105PHYS-4 and 203MATH-3

214EE-3 Electric Circuit Analysis **3 (3,0,1)**

Frequency response of RLC and selective circuit: concept of transfer function, resonance, bode plots, introduction to filters; Two-Port networks; Mutual inductance and transformers; Transient analysis of first and second order circuits; Three phase circuits; Introduction to Op-Amp, ideal characteristics with simple applications; Diode characteristics, clipping and rectification.

Pre-requisite: 211EE-3.

215EE-3 Electromagnetism (II) **3 (3,0,1)**

Time varying fields; Faraday's law. Transformer and motional emfs; Displacement current; Maxwell's equations and time harmonic fields; Wave equation; Power transfer and Poynting vector; Plane wave propagation in free space, in lossy dielectrics and in good conductors; Polarization; Reflection of plane wave at normal and oblique incidence; Transmission lines; Impedance matching; Introduction to radiation and antennas; Antenna parameters; Wire antennas.

Pre-requisite: 212EE-3.

331EE-3 Logic Design **3 (3,0,1)**

Number systems; Boolean algebra and logic gates; Simplification of Boolean functions; Combinational logic circuits design and analysis; MSI and PLD components; Introduction to synchronous sequential logic; Flip flops; Analysis of clocked sequential circuits; State reduction and assignment; Design of synchronous sequential circuits and PLA's.

332EE-1 Logic Design Laboratory **1 (0,2,0)**

Familiarization with logic circuits laboratory; Introduction to logic gates; Implementation of Boolean functions using AND and OR gates; NAND and NOR implementation; XOR and adders; Design of combinational circuits; Flip-flops; Design of sequential circuits; Sequential PLA's.

Pre-requisite: 331EE-3

321EE-3 Signals and systems Analysis **3 (3, 0, 1)**

Motivation and Applications, Signal Classifications, Signal Operations, Singularity Functions; Linear time-Invariant Systems and Convolution; Correlation; Fourier Series and Transform for continuous and discrete time signals; Applications; Laplace transform and applications; Introduction to z-transform.

Pre-requisite: 214EE-3

333EE-3 Basics of Electronic Devices **3 (3, 0, 1)**

Intrinsic and doped semiconductors, drift and diffusion currents. PN junction diode: basic structure, I-V characteristics, large and small-signal models. Bipolar junction transistor (BJT): basic structure, modes of operation, dc biasing, dc and small-signal models, single stage BJT amplifiers. Field-effect transistors (FET): structure and operation of enhancement and depletion MOSFETs, I-V characteristics, dc biasing. Introduction to JFET.

Pre-requisite: 214EE-3

334EE-1 Basic Electronics laboratory (1) 1 (0,2,0)

Introduction to the lab tools. I-V characteristics of diode. Clipping circuits using diodes. Rectification using diodes. Zener diode and regulators. BJT dc biasing. CE BJT amplifier. MOSFET dc biasing. CS MOSFET amplifier. Simple AM receiver circuit.

Pre-requisite: 333EE-3

325EE-3 Electric Machines 3 (2, 2, 1)

Transformers (construction, operation of single-phase transformers, equivalent circuit, voltage regulation and efficiency, auto – transformers, three-phase transformers), AC machinery fundamentals, three-phase induction machines (construction, operation, equivalent circuit, performance calculations, starting of induction motors, speed control), small AC motors (single-phase induction motors, reluctance and hysteresis motors, universal motors, servo motors, stepper motors.

Pre-requisite: 212EE-3 and 214EE-3

341EE-3 Communications Principles 3 (3 , 0 , 1)

Overview and Basic elements of Communication Systems; Signal Analysis; Transmission through Systems and Channels; Modulation; AM; Frequency Conversion; FM and PM; Superhetrodyne Receiver; FDM; Stereo Broadcasting; Sampling; Pulse Modulation (PAM, PWM, PPM); TDM; Pulse Code Modulation (PCM); DPCM and DM; Regenerative Repeaters; Advantages of Digital Communication; Line Coding (Binary Signaling); Introduction to Digital Modulation (ASK, FSK, PSK).

Pre-requisite: 321EE-3

342EE-1 Communications Lab 1 (0, 2, 0)

AM and FM modulation and detection: PCM and delta modulation; TDM; shift- keyin, basics of modem technology; ASK; FSK; PSK; Line coding and decoding.

Pre-requisite: 341EE-3

323EE-3 Automatic Control **3 (3, 0, 1)**

Review of mathematical background (complex variables, Laplace, Diff. Equations); System representation (block diagram, transfer functions, signal flow graph) Modeling of electric and mechanical systems; State variable analysis; Stability; Time domain analysis; Root locus; Frequency domain analysis; Introduction to PID control

Pre-requisite: 321EE-3

324EE-1 Automatic Control Lab **1 (0, 2, 0)**

Experiments to support control theory using physical processes (e.g. water level, temperature control, light intensity control, etc); Control system simulation using Matlab; Modeling of physical (experimental) equipment; Static performance; Transient analysis; Measuring devices; Two-position control; Proportional control; PID control;

Pre-requisite: 323EE–3

335EE-3 Introduction to Microprocessors **3 (3, 0, 1)**

Microprocessors architecture; Addressing modes and techniques; Instruction set; Assembly language programming; Interrupt systems; Input/output devices and timing; Memory devices; Future trends in microprocessors.

Pre-requisite: 331EE-3

336EE-1 Microprocessor and Microcontroller Laboratory **1 (0, 2, 0)**

Introduction to microprocessors and their architecture; Microprocessor C/Assembly programming and machine code generation; RAM and EPROM; RS-232C; SCI and serial port interface; Parallel I/O interface and DMA; Programmable I/O interfaces and UART; DAC and ADC converters; Real time implementation; Project. Introduction.

Co-requisites: 335EE-3

351EE-3 Computing programming for Engineers **3 (2, 2, 0)**

Introduction to MATLAB system, generate matrices and perform, plot data, annotate graphs, create scripts and functions, construct and manipulate data structures, set up a basic data analysis. How Simulink Software Interacts with the MATLAB, Creating a Simulink Model, Modeling a Dynamic Control Systems. Introduction to LabView, virtual instruments, LabView environments, creating, editing and debugging a VI, creating a sub VI, loops and charts, Arrays, graphs, clusters, case and sequence structures, formula node.

Pre-requisite: 204GE-3

490EE-0 Summer Field Training **0(0, 3, 0)**

A continuous period of 60 days of summer training spent in industry working in any of the fields of electrical engineering. The training should be carried out in an organization with an interest in one or more of these fields. On completion of the program, the student is required to submit a formal written report of his work.

Pre-requisite: Minimum credit hour achieved before training is 90.

491EE-2 Graduation Project I **2 (2, 0, 0)**

The graduation project is a culminating handy course work for which the students are expected to integrate and apply what they have learned through previous academic work and field experiences, with faculty supervision. These projects may be "new," continuation of work done in previous courses; or may be projects started in a previous course that become significantly expanded and enhanced for the thesis. It has two phases- to be taken in consecutive two semesters at senior level.

At the beginning of the semester, the students propose a topic on which they are supposed to work as a group. Project students meet in class weekly, discuss their research, and screen their progresses for peer and faculty critique and suggestions. At the end of the semester, students present their thesis projects to the supervising committee.

Pre-requisite: 323EE-3 and 351EE-3

426EE-3 Fundamental of Power Systems **3 (3, 0, 1)**

Power system components and representation; Transmission line and cable parameters; Analysis of transmission and distribution lines; Electric insulators; Grounding systems; High voltage surges

Pre-requisite: 214EE-3

416EE-3 Electrical Measurements **3 (3, 0, 1)**

Measurement fundamentals: units and errors, statistical analysis: DC and AC analog digital meters constructions :DC and AC bridge : Oscilloscope: CRT, trigger sweep circuits: Oscilloscopes, Analog and Digital Multi meters to measure electrical parameters: Transducers and sensors; passive and active : specifications of Spectrum analyzer, Liquid crystal displays (LCDs) and optical fiber sensor

Pre-requisite: 213EE-1

437EE-3 Digital Signal Processing **3 (3, 0, 1)**

Review of discrete-time signals and systems; The Discrete-Time Fourier transform, Fast Fourier Transform, Z Transform, Recursive and no recursive digital filters design and realization; Decimation and interpolation; Applications of digital signal processing in communications.

Pre-requisite: 321EE-3

422EE-3 Electromechanical Energy Conversion **3 (3, 0, 1)**

Synchronous machines (construction, internal voltage, equivalent circuit, phasor diagram, performance of turbo-alternator, generator operating alone, parallel operation of AC generators, synchronous motor, steady-state operation, starting), DC machines (construction, classification, performance, motor characteristics, starting of DC motors, speed control of DC motors).

Pre-requisite: 325EE-3.

492EE-3 Graduation Project II **3 (2, 2, 0)**

The graduation project is a culminating handy course work for which the students are expected to integrate and apply what they have learned through previous academic work and field experiences, with faculty supervision. This is the continuation of graduation project-I, and consequently graduation project-II is supposed to be taken in the consecutive semester.

Throughout the semester, the students try to implement what they proposed in graduation project-I as a group. Project students meet in class or lab weekly, segregate the work into sub-projects, integrate the individual works in order to reach their target, and faculty critique and suggestions. At the conclusion of the semester, students present their design projects along with the thesis to the supervising committee.

Pre-requisite: 491EE-2

427EE-3 Electric Drives **3 (3, 0, 1)**

Principles of electric drive; Definitions; Electrical considerations: running, starting, braking; Mechanical considerations: type of enclosure, noise, drive transmission, motor selection; Electric traction; DC & AC solid state drives.

Pre-requisite: 323EE-3.

417EE-3 Utilization of Electric Energy **3 (3 , 0 , 1)**

Lighting and electric wiring; Electric heating; Cooling and heating of buildings; Welding; Electrolysis; Power quality issues; Renewable energy sources; Power factor improvement.

Pre-requisite: 426EE-3.

428EE-3 Applied control **3 (3, 0, 1)**

Basics of system modeling and analysis; PID controller design; Transducers and actuators; Real time control; Control applications (power systems, robotics, etc.); Control design project

Pre-requisite:323EE-3.

FACULTY AND STAFF

The Electrical Engineering Department has good number of faculty members having Ph.D in different specialization in electrical and electronics field. The name of the faculty members with their specialization and designation is mentioned in the table below:

Table 6: List of Faculties with Qualifications and Designation in Electrical Engineering Department

Faculty Name	Qualification and Specialization	Designation	E mail
Abdullah S. Alwadie	PhD-Electrical Engineering, 2003 Specialization: Control	ASC	alwadie@hotmail.com
Abdel-Hamid Mohamed Abdel-Hamid	PhD-Electrical Engineering,1992 Specialization: Power and control	P	ammohammed@nu.edu.sa
Akram Ibrahim Elmitwally	PhD-Electrical Engineering, 2002 Specialization: Power and machines	ASC	aielmitwally@nu.edu.sa
Yousfi Khemissi	PhD-Electrical Engineering, 1986 Specialization: Control	ASC	kayousfi@nu.edu.sa
Abdelouahab Amrani	PhD Electrical Engineering, 1988 Specialization: Electronics	ASC	asamrani@nu.edu.sa
Ayman Taher Ali Hindi	PhD Electrical Engineering, 2004 Specialization: Power	AST	athindi@nu.edu.sa

Mohammad Shahed Akond	PhD Electrical Engineering, 2011 Specialization: Photonics	AST	msakond@nu.edu.sa
Salim Nasar Mursal	PhD Electrical Engineering, 2005 Specialization: Radio	AST	snmursal@nu.edu.sa
Abdullkarem Hussein Mohammed Almawgani	PhD Electrical and Electronic Enginering,2011 Specialization: Communication Engineering	AST	ahalmawgani@nu.edu.sa
Adam Reda Hasan Alhawari	PhD Communications Engineering,2012 Specialization: Wireless Communication Engineering	AST	aralhawari@nu.edu.sa
Saifur Rahman Masihur Rahman	Ph.D Electronics and Communication Engineering,2015 Specialization: Sensors (Electronic Nose)	AST	srrahman@nu.edu.sa
Muhammad Irfan	PhD in Electrical and Electronics Engineering Specialization: Control and Automation	AST	miditta@nu.edu.sa
Seif Shebl Seif	M.Sc. – Electrical Engineering, 2009 Specialization: Communication Engineering	AST	ssseif@nu.edu.sa

Hisham Alghamdi	PhD-Electrical Engineering, 2016 Specialization: High Voltage	AST	haalghamdi@nu.edu.sa
Fahad Alkahtani	M.Sc.-Electrical Engineering,2013 Specialization: Power Electronics	L	fsalkahtani@nu.edu.sa
Essam Abdullah Al-Yafrosi	M.Sc. - Telecommunication Engineering,2007 Specialization: Communication Engineering	L	iaalyafrosi@nu.edu.sa
Muneer Abusaq	M.Sc. – Electrical Engineering, 2015 Specialization: Power	L	maabusaq@nu.edu.sa
Omar Alshorman	M.Sc.-Computer Engineering,2012 Specialization: Embedded Systems	L	oalshorman@nu.edu.sa
Ali Saieed ALqahtani	B.Sc-Electrical Engineering	TA	asqahtani@nu.edu.sa
Mosfer ALnajrani	B.Sc-Electrical Engineering	TA	maalnajrani@nu.edu.sa

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor L = Lecturer TA= Teaching Assistant

Facilities (Offices, Classrooms and Laboratories):

Offices Facilities:

The Electrical engineering department occupies the part of three floors in the College of Engineering building within Najran University campus. There are number of offices for Faculty members, one secretariat room, one conference room and eight laboratories. Each staff member has office with space ranging from 6 to 12 square meters. Office size allows enough space for individual and collective work including the possibility to hold meetings with at most two to three colleagues or students. All facilities that needed are available for each office. Sample of faculty members' office is shown in the figure below.

Figure7 Sample of Electrical Engineering faculty office

Classrooms Facilities:

The College of Engineering provides excellent teaching classrooms. Classrooms are adequately equipped with chairs and desks, instructor desk, interactive data show, and a white board. Each classroom is equipped with a wireless network allowing instructors to use internet. There are 23 classrooms available each with capacity of 30 students (Fig.8) and 2 large-size classrooms each with capacity of 60 students (Fig.9), also there are two amphitheaters with capacity of 150 students with high audio and video facilities.

Figure 8 Picture showing a typical small classroom

Figure 9 Picture showing a typical large class room

LABORATORY FACILITIES

The EE department is one of the largest departments in the university. The department has adequate number of laboratories for teaching and research work. Teaching laboratories are equipped with all necessary equipment to facilitate running the experimental work to enhance student's understanding of the material. Qualified technicians look after these laboratories by preparing experiments, fixing equipment, copying lab manuals, etc. Also currently there is a research laboratory supervised by some faculty members to carry out research in their specialization area and it also supports final year project activities.

Electrical Power Laboratory

This laboratory assists the students to study drives, transmission and distribution lines and modern powers system.

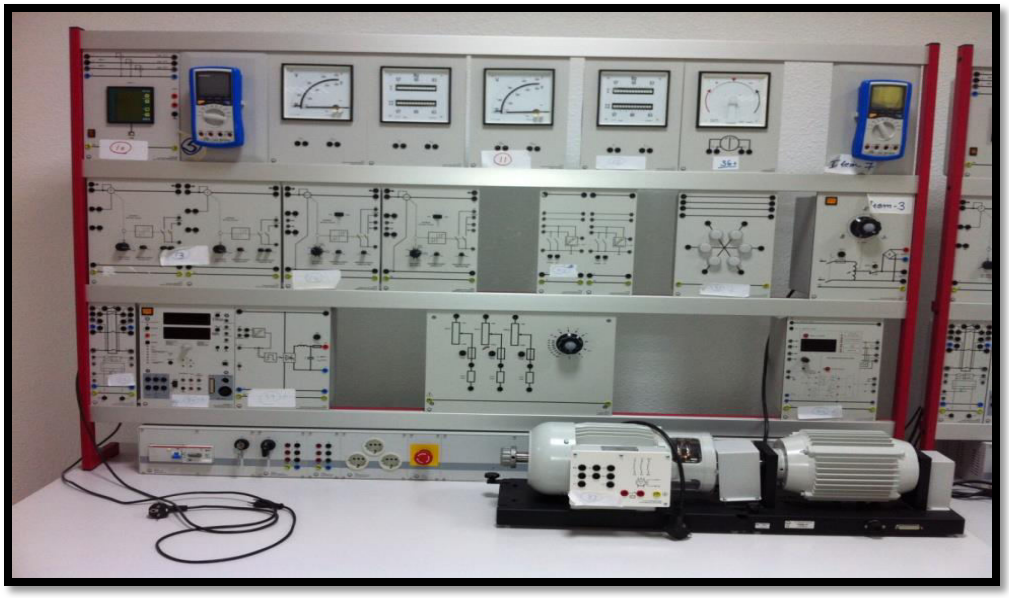


Figure 10 A partial view of the Electrical Power and Machines laboratory

Communication Laboratory

This lab is used by the students to perform different experiments related to antennas, wave propagation, analog and digital communication and microwave technology

Figure 11 A partial view of the Communications laboratory

Electrical Circuit Laboratory

This lab is used by the students to perform all electrical circuit experiments including AC and DC circuits.

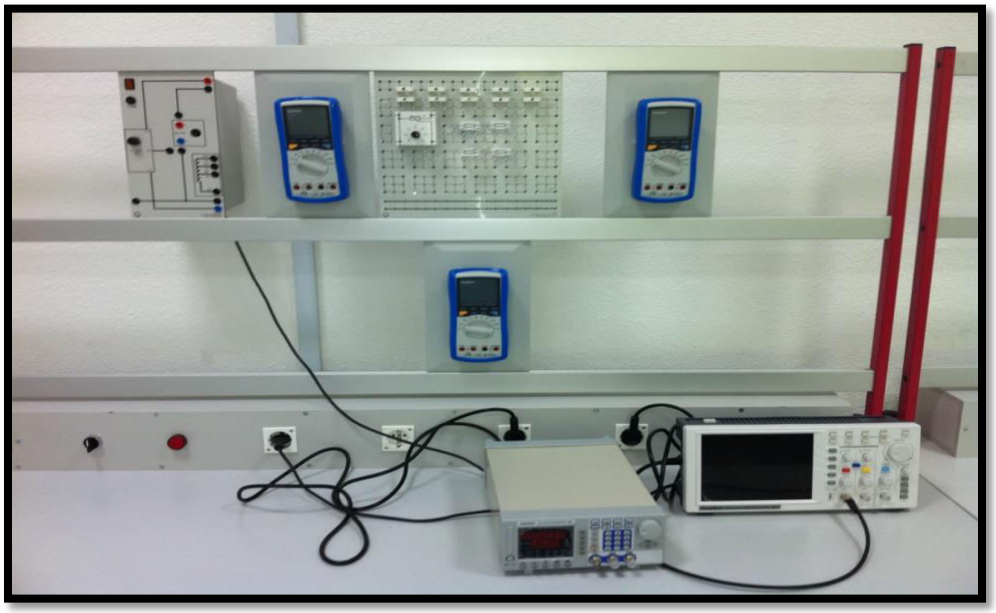


Figure 12 A partial view of the Electric Circuit laboratory

Electronics Laboratory

In this lab the students learn electronic circuits and digital logic design experiments.

Figure 13 An overall view of the Electronics laboratory

Control Laboratory

This lab is used to perform experiments related to control using MATLAB Simulink, Cassy-Lab and PLC.

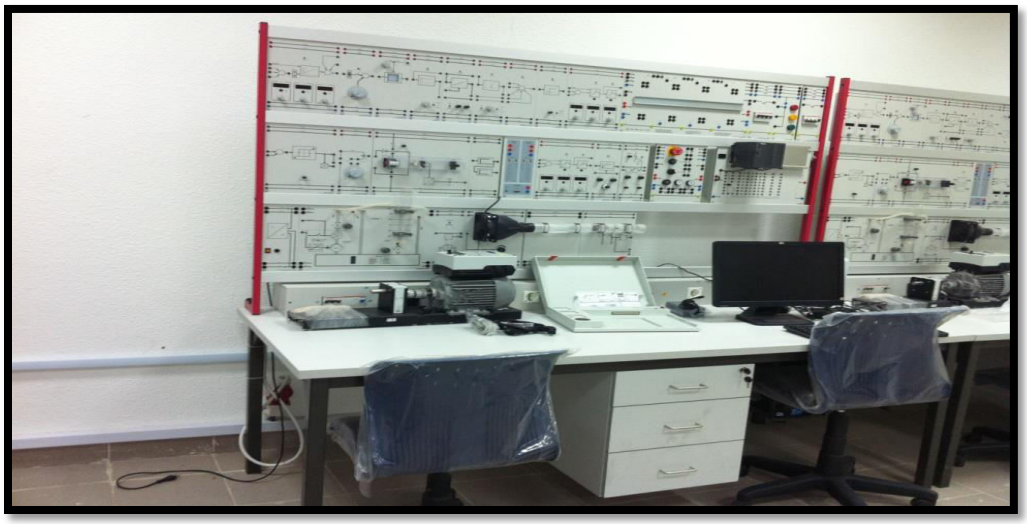


Figure 14 A partial view of the Automatic Control laboratory

Microprocessor and Microcontroller Laboratory

Experiments related to 8086 microprocessors and microcontrollers are performed in this lab.

Figure 15(a) A partial view of the Microprocessor laboratory

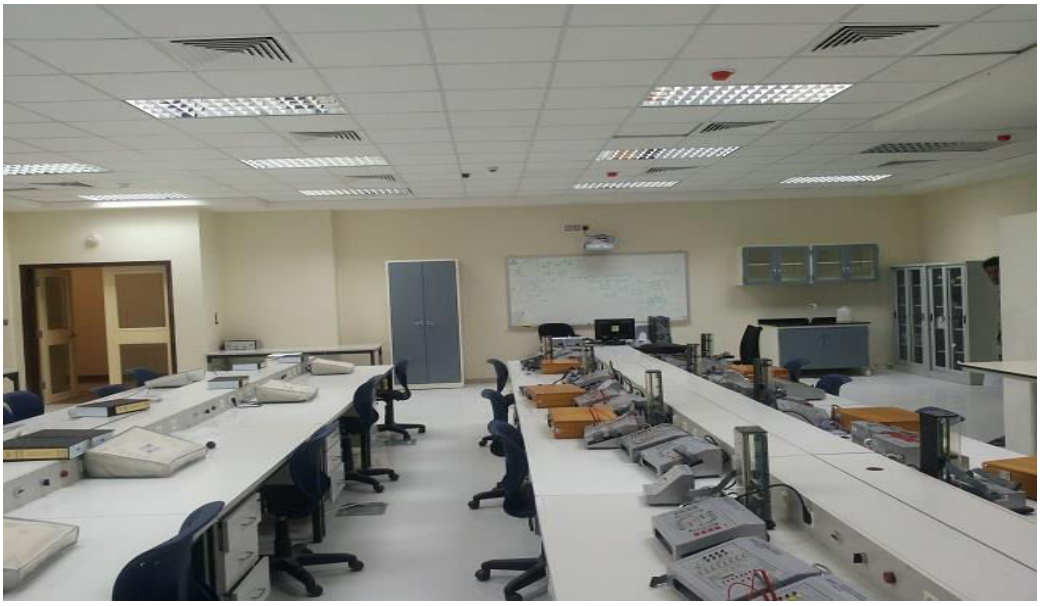


Figure 15(b) A partial view of the Microprocessor laboratory

Lab view and Renewable Energy Laboratory

In this lab the students and teacher perform their research work on renewable energy using lab view.

Figure 16 A partial view of Labview and Renewable Energy Laboratory

Computer Laboratory

In this lab the students perform programming on c and c++ languages to compete with the latest technology.

Figure 17 A partial view of Computer Laboratory

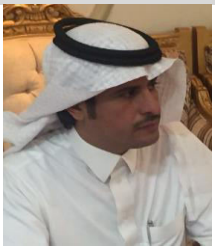
DEPARTMENT COMMITTEES & UNITS

The department has several committees and units each of which is composed of a convener and at least two faculty members to assist in managing academic and administrative affairs of the department.

1. Assessment & Evaluation Committee
2. Curriculum Committee
3. Training & Graduation Project Committee
4. Surveying Committee
5. Academic Advising Committee
6. Research & Community Service Committee
7. Registration & Examination Committee
8. Student's Activity Committee
9. Ethics, Promotion, Scholarships & Employment Committee
10. Exam Review Committee
11. Accreditation & Quality Committee

College Advisory Council (CAC)

Figure 18 College Advisory Council

1.	**Associate Professor Dr. Abdullah Alwadie** **Dean, College of Engineering** **Najran University** **Najran, Saudi Arabia** **Tel: 00966 507776986** **Email:** asalwadie@nu.edu.sa	
2.	**Engineer Hassan Salem Al Juraib** **General Manager** **University Project department** **Najran, Saudi Arabia** **Tel: 00966 556663166** **Email:** hasgr999@hotmail.com	
3.	**Engineer Erfan Hatem Al Mansoor** **Assistant Manager** **University Project department** **Najran, Saudi Arabia** **Tel: 00966 544196000** **Email:** ehalmansoor@hotmail.com	
4.	**Engineer Raid Faisal Alghadam** **Civil and Safety Engineer** **University Project department** **Najran, Saudi Arabia** **Tel: 00966 543311138** **Email:** ralghadam@hotmail.com	
5.	**Associate Professor Abdulnoor A.J Ghanim** **Civil Engineering Department** **College of Engineering** **11001 Najran, Saudi Arabia** **Email:** aaghanim@nu.edu.sa **Tel: 00966 545529898**	
6.	**Assist. Prof. Dr. Ibrahim Hakeem** **Civil Engineering Department** **College of Engineering** **11001 Najran, Saudi Arabia** **Email:** iyhakeem@nu.edu.sa **Tel: 00966 569584746**	

7.	**Assist. Prof. Dr. Saleh Hamel Al-Salem** **Civil Engineering Department** **College of Engineering** **11001 Najran, Saudi Arabia** **Email:** dr.saleh.uk@gmail.com **Tel: 00966 555 72 4545**	
8.	**Engineer Saleh G. AlGhamdi** **Director of SEC-Najran** **Najran, Saudi Arabia** **Tel: 00966 530588559** **Email:** saLdaghish@se.com.sa	
9.	**Engineer Fawaz Masoud Alhadi** **Najran College of Technology** **Head of Electrical Technology Department** **Najran, Saudi Arabia** **Tel: 00966 503724374** **Email:** falhadi@tvtc.gov.sa	
10.	**Engineer Al-Hassan Muhi Al-Mutair** **Saudi Electrical Company** **Transmission Engineer** **Najran, Saudi Arabia** **Tel: 00966 533008835** **Email:** hmmutair@se.com.sa	
11.	**Engineer Al-Hassan Manea Al-Zamanan** **Saudi Electrical Company** **Distribution Engineer** **Najran, Saudi Arabia** **Tel: 00966 544774407** **Email:** HMzamananz@se.com.sa	
12.	**Assist. Prof. Dr. Abdulkareem Al-Mawgani** **Electrical Engineering Department** **College of Engineering** **11001 Najran, Saudi Arabia** **Email:** ahalmawgani@nu.edu.sa **Tel: 00966 534607367**	
13.	**Assist. Prof. Dr. Adam Alhawri**	

Electrical Engineering Department
College of Engineering
11001 Najran, Saudi Arabia
Email: aralhawari@nu.edu.sa
Tel: 00966 541081747

Objective of College Advisory Council (CAC)

The College Advisory Council (CAC) aims at contributing to the continuous improvement of the College's academic programs, guiding its future policies, evaluating its strategic plans and communicating with the public and private sectors.

General Organization of College Advisory Council (CAC)

The College Advisory Council shall nominate the members of the Council not less than nine members and not more than fifteen members. The composition shall be approved by the Rector of the university.

- The composition of the Council shall be as follows:
  - Dean of the College.
  - Vice Dean for Development and Quality.
  - Members (seven to thirteen) with experience in various business sectors from inside or outside the Kingdom, including some distinguished graduates.

Mode of Functioning for College Advisory Council (CAC)

- The Board shall, at its first meeting, elect the President and Vice-President, provided that he is not the Dean of the College and the Secretary of Development and Quality shall be the Secretary of the College Advisory Council.
- The Board shall meet at the invitation of its President at least twice a year.
- The sessions of the Council may be held inside or outside the college and it may invite any person outside of the Council Committee to attend its meetings.
- Membership of the Council shall be for two years subjected to renewable as required.
- The certificate of appreciation shall be given to the Members of the Board at the end of their term from the Advisory Council.

Duties of the CAC Officers

a) **President:** It shall be the duty of the President to act as the executive head of the College Advisory Council and to preside over its meetings. The President shall have power to call for meetings of the Council and to set the agenda. The President shall provide appropriate information and data necessary for the Council to carry out its activities and shall inform the members on actions and recommendations of the Council.

b) **Vice- President:** The Vice- President shall assist the President in the performance of assigned duties and, in the absence of the President, shall assume the power and responsibilities of the President.

c) **Secretary:** The Secretary shall maintain accurate, action-based minutes of all meetings, distribute minutes to each member on a timely basis, and be responsible for the general communication required for the efficient and effective discharge of the Council's duties and responsibilities.

Functions of the Advisory Council

Advisory Council is purely advisory. It is not an administrative, legal or policy making body. Its support for the college and its students involves certain roles and/or responsibilities. The main functions of CAC members are:

- Making proposals on what serves the future of the college.
- Provide ways to deepen partnership between the college and the local and global community.
- Contribute to the development of programs and curricula according to the requirements of the labor market.
- Contribute to the implementation of the strategic plan of the College.
- Provide proposals that should provide material and moral support to the College.
- Contribute to the establishment of a coordination mechanism to establish joint projects between the college and the sectors of society in order to find solutions to the problems of society in an integrated manner.
- To propose methods to provide funding sources for the College's development projects.
- Identifying jobs or entrepreneurial opportunities, through co-op work experiences, internships, apprenticeships, topical summits, or career fair involvement.

To check the current and future trends affecting the program and then recommending the knowledge, skills and competencies required for successful career entry or re-entry in KSA.

ADMISSION REQUIREMENTS & REGULATIONS FOR THE BACHELOR PROGRAMS

Admission Requirements of the College of Engineering

Students who are admitted to electrical engineering program in Najran University should satisfy the general and special requirements as follow-

General Requirement

The general requirements are enlisted as follow-

1. The student shall only be admitted to the university upon the calculation of his average on 30% in general aptitude, 30% in achievement test and 40% in general secondary education, if the students wishes to enrol in preparatory year.
2. The student should obtain the general secondary certificate or its equivalent from the kingdom or abroad.
3. Not more than two academic years should have elapsed from the date of his obtaining such certificate or its equivalent.
4. The student should have a good conduct and proper behaviour.
5. The student should successfully pass exam or personal interview (when conducted).
6. The student should be medically fit.
7. The student should obtain approval from his authority to pursue his studies if he works for any governmental or private body.
8. The students should not have been expelled from Najran University or any other university for academic or disciplinary reasons.
9. After the students is admitted, if it turns out that he has already been expelled for disciplinary or academic reasons, his admission shall be considered as void.
10. Student fulfilling all the requirements should present the stipulated documents to the deanship of admission and registration of the university.
11. The enrolled student cannot be enrolled for another degree at the same university or at any other university and should not have already obtained such degree.
12. The files of student shall be ruled out if it is found that he is late for admission tests. .
13. The files of student shall be ruled out if it is found that he is late for personal interviews and unable to present a genuine reason.

14. Student who are late in carrying out the admission procedures within the deadline set by the university and do not present an acceptable excuse to the Deanship of Admission and Registration shall not be admitted.

The admission procedures are regulated by the "Education and Examination Regulations" available at URL
http://www.nu.edu.sa/en/admissionrequirements;jsessionid=3B5F1C1672251709F4F35BA799549E70.s2?p_p_id=82&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&_82_struts_action=%2Flanguage%2Fview&_82_redirect=%2Fen%2Fadmission-requirements&languageId=ar_SA

Transfer of Students and Transfer Courses

Transfer of students to electrical engineering program at Najran University can be done through three different channels as follows:

Transfer from Other Universities

General Requirements: With the consent of the administrator in charge, students may transfer from other universities in conformity with the rules adopted by the student affairs committee and according to the following general guidelines:

- The student must be enrolled at an accredited college or university.
- The student must not have been dismissed from that university for educational or disciplinary reasons.
- The student must meet the requirements of admission transfer.
- The transferred students are required to complete more than 60% of the total required credit hours in Najran University. The college council is responsible for equating the courses studied at other universities to the equivalent courses of the department and accordingly a recommendation is forwarded to the department council. The equated courses are then credited and applied to the student's academic record, but not be applied to the cumulative GPA.
- The transfer procedure should be completed within the period specified by the Dean of Admission and Registration, provided that the period does not exceed end of the second week from the beginning of the academic semester. After the fulfilment of all requirements, the student receives a transfer notice allowing him to attend courses after the issuance of a university ID.
- The enrolment is considered void in the case of coming out that the student had been previously dismissed from a university due to disciplinary or educational reasons.

These requirements and process for accepting transfer students are governed by the Article #15.1 of the Policy on Regulations of Study and Examinations.

Additional Requirement: In addition to the above mentioned general requirements, few more requirements are set by the council of electrical engineering program. These requirements may be changed each year by the approval of program council. Currently these requirements are:

- Assure the students finish successfully the Preparatory Year Program or equivalents.

- Verify the condition of specialization in Najran University.
- Transfer from the similar engineering program.
- The student should have a minimum cumulative GPA of 3.5 (out of 5.0) or equivalent from a reputed college. This is complemented with other conditions developed by the College Council on a yearly basis.

Internal Transfer from Other Colleges within the University

General Requirements: With the consent of the administrator in charge, students may transfer from one college to another within the university in conformity with the regulations adopted by the Student Affairs Committee, and according to the following guidelines:

- The Student's grade point average (GPA) should not be less than 2.0.
- The Student must not have been previously transferred during his study at the university.
- The academic period remaining must be sufficient for the completion of the graduation requirements.
- The student should apply to the dean of admission and registration about his transfer from one college to another by completing the appropriate form. Upon completion of the transfer procedures, the student will receive a notification allowing him to study at the college in which they are transferred to.
- All the transfer procedures are completed within the period determined by the office of dean of admission and registration, provided that the period does not exceed the first week after beginning of an academic semester.
- All the completed courses that are transferred from one college to another are academically recorded including semester grades, and grade point average (GPA) throughout his study in the university.

Additional Requirements: Few additional requirements are set by the council of electrical engineering program beside the above mentioned general requirements. These requirements could be changed each year with the approval of program council. These requirements are:

- Students can apply for transfer only after studying at least one semester in the college they are registered. (Summer semester is not counted).
- Transfer from any non-science college to any college of engineering is not allowed.
- Transfer from any college that does not require preparatory year, is not allowed.

The minimum GPA for transferring from other colleges of the University to electrical engineering program is illustrated in Table below.

Table 7 The condition for transfer of student within the University

From	To	Minimum CGPA	Number of students
College of Medicine	Electrical Engineering Program College of Engineering	4	According to the capacity of the department which is decided each year by the department council
College of Dentistry	Electrical Engineering Program College of Engineering	4	According to the capacity of the department which is decided each year by the department council
Applied Medical Sciences	Electrical Engineering Program College of Engineering	4	According to the capacity of the department which is decided each year by the department council
College of Computer Science and Information Systems	Electrical Engineering Program College of Engineering	4	According to the capacity of the department which is decided each year by the department council

Transfer from Any Other Program to Electrical Engineering within the College of Engineering

General Requirements: With the consent of the administrator in charge, students may transfer from any other program of the college to electrical engineering within the university in conformity with the regulations adopted by the student affairs committee, and according to the following guidelines:

- The student must have spent at least one semester in their major.
- The student is not entitled to be transferred within the same college from one major to another for more than twice during their tenure in the university.
- The academic period remaining must be sufficient for completion the graduation requirements.
- All the studied courses that are transferred from one major to another are mentioned in their academic record, including any awards, semester grades, and grade point averages GPA throughout their tenure in the university.

Additional Requirements:

The minimum GPA for transferring student within the University to electrical engineering program is illustrated in table below.

Table 8 Transfer to Electrical Engineering Program from any other program of the College of Engineering

From	To	Minimum CGPA	Max number of students allowing to transfer per semester
Department of Civil Engineering	Department of Electrical Engineering	4	According to the capacity of the department which is decided each year by the department council
Department of Architecture Engineering	Department of Electrical Engineering	3.8	According to the capacity of the department which is decided each year by the department council

Visiting Student of Electrical Engineering to Other Universities

A student from the program (EE) is entitled to complete some courses in another university upon the fulfillment of the following conditions:

- The student should be regular in their academic record and apply using a prescribed form available on the website: http://www.nu.edu.sa/web/engineering-college/70
  The college should receive the application at least two semesters earlier from their enrolment as a visitor student.
- The student must receive a prior consent from their academic institution permitting him to study as a visitor student along with the courses to be studied.
- The college is responsible to stipulate the equivalence of courses between two programs. The student would be given official letter from the Dean of Admission and Registration Affairs enabling them to begin registration.
- The studied courses must be completed at an accredited college or university.
- The courses, studied by the student outside the university, are made equivalent by considering all of its contents and the assigned credit hours must not be less than any courses included in the graduation requirements.
- The maximum number of credit hours that can be counted from other university should be less than 20% of the total credit hours required to graduate at Najran University.
- The equivalent courses for the visiting student are not considered in calculating their cumulative GPA.

- The student must provide the obtained grades to the office of Dean of Admission and Registration within two weeks of the beginning of the academic semester. If the student fails to submit their grades, they are considered as non-attending.

Visiting Student from Other Universities to Electrical Engineering Department

The student at another university is entitled to study in Najran University as a visiting student under the following conditions-

- The student should have an academic record of at least two semesters from their current university.
- The student must not have been dismissed due to disciplinary or educational reasons.
- The student must obtain a prior written consent and enlisted courses to be studied from the deanship of admission and registration of his current university in order to study as a visitor in Najran University.
- The maximum limit of academic semesters that the student is allowed to study as a visitor is 2 semesters.
- The courses the student wishes to study should be registered in accordance with the registration requirements.
- The visiting student does not receive any grants by Najran University.
- By the end of his study, the student is provided with the results obtained in the courses studied by a transcript demonstrating the attained grades.

Transfer Credit

Courses, taken by the students outside the Najran University, may be transferred upon the approval from the college council. Electrical engineering department or the concern department recommends on the approval of the equivalent courses along with its corresponding credit hours. The transferred equivalent courses are recorded in the student's academic profile. The equivalent credit hours are approved for only those courses in which the students has obtained a letter grade of 'C' or above. But the points of the equivalent courses are not used in the computation of CGPA of the student.

The transferred student submit an application asking for equivalent credits to the chairman of electrical engineering department along with the original academic record and certified detailed description of the courses taken outside Najran University. The chairman of electrical engineering department refers the application to the concerned academic advisor and curriculum committee for evaluation of equivalent credit. This evaluation is performed on a case-by-case basis. This evaluation is considered according to the following circumstances:

a) The credit hour of the course is equal or more than that of the equivalent course in Najran University.
b) The grade of the course obtained is 'C' or above.

c) The content of the course matches at least 80% of the same in Najran University.

After the department approves the credit transfer, the department applies for getting approval of the college council using the equivalency evaluations. After college council approves the application, it is sent to the deanship of admission and registration. The requirements and process for courses equivalency and credit transfer are governed by Article #43 of the Policy on Regulations of Study and Examinations.

Out of the six engineering sections mentioned in Figure 1 (a), Organizational Chart for the College of Engineering, only three are running presently and the rest three i.e. Mechanical Engineering, Chemical Engineering and Industrial Engineering Department are under the progress to get start from the next session. The lab and syllabus curriculum are ready for these three departments and is pending for the approval at the university level.