دليل قسم الهندسة الكهربائية

Department of Electrical Engineering

College of Engineering

University of Baghdad

(Established at 1950)

(Academic Year 2017-2018)

Message from the head of the Department of Electrical Engineering

Dr. Nizar Hadi Abbas

The Department of Electrical Engineering was established in 1950. So far, many thousands of Electrical Engineers were graduated from this department and they are working in Iraq and abroad. The electrical Engineer will study for 4-year program and award B.Sc. degrees in electrical engineering, which is equivalent to about 160 credit hours and done field training in their specializations. Electrical Engineering offers a wide range of employment opportunities in different fields, including, but not limited to electrical power generation and distribution, installation, computer applications, IT, electronic circuit design and communication systems.

Also, the Electrical Engineering Dept. awards (M.Sc. and Ph.D. degree in three disciplines. Power and Machines; Electronics and Communications; and Computer and Control.

The minimum period of the M.Sc. degree is 2 years and the period of the Ph.D. degree is 3 years. These programs after the B.Sc. degree.

Dr. Nizar Hadi Abbas
Head of the Department of Electrical Engineering.

Contents

The former heads of the department

No.	Name	Date
1.	Dr. Slious Dano	1951-1960
2.	Dr. Jalal AL-Salhi	1960-1963
3.	Dr. Slious Dano	1963-1967
4.	Dr. Salah AlSamari	1967-1969
5.	Dr. Nazar Khalil Wafi	1969-1970
6.	Dr. Mothana Kubba	1970-1970
7.	Dr. Taha Al-Naami	1970-1973
8.	Dr. Nazar Khalil Wafi	1973-1975
9.	Dr. Mohammed Al-Hakak	1975-1980
10.	Dr. Ali Al-killidar	1980-1981
11.	Dr. Jafaar Alwash	1981-1985
12.	Dr. Salih Al-Aragi	1985-1989
13.	Dr. Ali Al-killidar	1989-2001
14.	Dr. Nihad Al-Rawi	2001-2003
15.	Dr. Kais Saaed Al-Sabagh	2003-2005
16.	Sulaiman Murtdha Abbas	2005-2011
17.	Dr. Dheyaa Jasim Kadhim	2011-2014
18.	Dr. Mahmood A.K. Abdulsttar Abdulsttar	2014- 2016
19.	Dr. Nizar Hadi Abbas	2016-Till Present Time

Staff of the Electrical Engineering Department

No.	Name	الأسم	General Specialty	Scientific Degree
1.	Nazar Khalil Wafi	أ.د. نزار خليل وفي	Communications	PhD., Prof. Emeritus
2.	Ali A. Al-killidar	أ.د. علي عبد الصالح الكليدار	Machines	PhD., Prof. Emeritus
3.	Jafaar H. Alwash	أ.د. جعفر حميد علوش	Machines	PhD., Prof. Emeritus
4.	Saleem Mohammed Ridha Ali Taha	أ.د. سليم محمد رضا	Electronics	PhD., Prof.
5.	Tariq Zeyad Ismaail	أ.د. طارق زياد اسماعيل	Communications	PhD. Prof.
6.	Sadiq Jassim Abouloukh	أ.م.د. صادق جاسم أبواللوخ	Computer and Control	PhD. Assist. Prof.
7.	Muna Hadi Saleh	أ.م.د. منى هادي صالح	Computer and Control	PhD. Assist. Prof.
8.	Firas Mohammed Tuaimah	أ.م.د. فراس محمد طعيمة	Power	PhD. Assist. Prof.
9.	Ibraheem Kasim Ibraheem	أ.م.د. إبراهيم قاسم إبراهيم	Computer and Control	PhD. Assist. Prof.
10.	Dheyaa Jasim Kadhim	أ.م.د. ضياء جاسم كاظم	Electronics and Communications	PhD. Assist. Prof.
11.	Zainab Tawfeeq Baqer	أ.م.د. زينب توفيق باقر	Computer	PhD. Assist. Prof.
12.	Nizar Hadi Abbas	أ.م.د. نزار هادي عباس	Computer and Control	PhD. Assist. Prof.
13.	Mohammed Nadhim Abbas	أ.م.د. محمد ناظم عباس	Electronics and Communications	PhD. Assist. Prof.
14.	Mahmood A.K. Abdulsttar	م.د. محمود عبدالقادر عبدالستار	Communications	PhD. Lecturer
15.	Fadhil Abbas Mahdi Al-Orimli	م.د. فاضل عباس القرملي	Power Electronics	PhD. Lecturer
16.	Bassim. M. H. Jassim	م.د. باسم محمد حسن جاسم	Power and Machines	PhD. Lecturer
17.	Hanan Mikhael D. Habbi	م.د. حنان ميخائيل داود	Power and Machines	PhD. Lecturer
18.	Asmaa Hameed Rasheed	م.د. أسماء حميد رشيد	Computer and Control	PhD. Lecturer

19.	Rabab Hameed Shghedl Al-Darraji	م.د. رباب حميد شغيدل	English	PhD. Lecturer
20.	Moretadha Jawad Kazim	م.د. مرتضى جواد كاظم	Electronics and Communications	PhD. Lecturer
21.	Ismael Shanan Desher	م.د. إسماعيل شنان دشر	Electronics and Communications	PhD. Lecturer
22.	Abdul-Sattar Abdul-Jabbar Wais	م.د. عبدالستار عبدالجبار ويس	Mathematics	PhD. Lecturer
23.	Ali Tweij Shaheen	م. د. علي طويج شاهين	Electronics and Communications	PhD. Lecturer
24.	Taghreed M.Ali A.Awahhab Al-Rufaye	م. تغريد محمدعلي عبدالوهاب	Computer and Control	M.Sc. Lecturer
25.	Saif Al deen Abdul Ameer	م. سيف الدين عبد الامير	Electronics and Communications	M.Sc. Lecturer
26.	Zainab Ibrahim Abbood	م. زينب إبراهيم عبود	Electronics and Communications	M.Sc. Lecturer
27.	Nadia Qasim Mohammed	م. نادية قاسم محمد	Computer and Control	M.Sc. Lecturer
28.	Ali Razooqi Hussein Al-lami	م.م. علي رزوقي حسين اللامي	Electronics and Communications	M.Sc., Assist. Lect.
29.	Thamir Mosa Ibrahim Al-Korbasy	م. م. ثامر موسى إبراهيم	Mechanical Eng.	M.Sc., Assist. Lect.
30.	Enas Hamd Ibraheem	م. م. إيناس حامد ابراهيم	Nuclear	M.Sc., Assist. Lect.
31.	Ahmed Muhsin Abdulmajeed	م. م. أحمد محسن عبدالمجيد	Power and Machines	M.Sc., Assist. Lect.
32.	Mostafa Abdl Jabbar	م. م. مصطفى عبد الجبار	Computer and Control	M.Sc., Assist. Lect.
33.	Mohanad Azeez Joodi	م. م. مهند عزيز جودي	Computer and Control	M.Sc., Assist. Lect.
34.	Huda Manhee Abdulabbas	م. م. هدى منهي عبدالعباس	Power and Machines	M.Sc., Assist. Lect.
35.	Raed Fouad Abbas	م. م. رائد فؤاد عباس	Power and Machines	M.Sc., Assist. Lect.
36.	Farah Mahdi Ali	م. م. فرح مهدي علي	Computer and Control	M.Sc., Assist. Lect.
37.	Abdullah Mohammed Abdulhadi Zyarah	م. م. عبدالله محمد	Computer and Control	M.Sc., Assist. Lect.

38.	Ammar Falah Mahmood	م.م. عمار فلاح محمود	Power and Machines	M.Sc., Assist. Lect.
39.	Rawad Luay Khaleel	م.م. رواد لؤي خليل	Computer	M.Sc., Assist. Lect.
40.	Akram Noori Merzah	م.م. أكرم نوري مرزه	Power and Machines	M.Sc., Assist. Lect.
41.	Farooq Abdulghafoor Khaleel	م.م. فاروق عبدالغفور خليل	Electronics and Communications	M.Sc., Assist. Lect.

Engineering Staff

No.	Name
1.	Shatha Akram Mahdi
2.	Souad Hassan Frhan
3.	Ansaf Jassim Naseef
4.	Nadhal Mohammad Ali
5.	Rawnaq Jawad Bakir
6.	Shurooq Faysal Najem
7.	Salam Jassim Mohammed
8.	Atyaf Saadi Madhloom
9.	Ahmad Mohammad
10.	Hafssa Amer Jasim

Computer Technical Staff

No.	Name
1.	Maysson Ghani Muhsin
2.	Widad Aziz Hassan

Technical Staff

No.	Name
1.	Faris Mustafa Duhi
2.	Amal Tarish Zeboon
3.	Salma Kadhem
4.	Ekhlas Abd Al-Razak
5.	Balsam Mahde Dawood
6.	Najat Hadi
7.	Ahlam Shkara
8.	Emad Ahmed
9.	Ahmad Ubeid
10.	Hasna Wannas

Administration staff

No	Name
1.	Shatha Kadhum Jasim
2.	Hwshiar Abdulhameed
3.	Nagham Tariq Allawi

The Undergraduate Curriculum

The annual system of study is followed in the department. The following is the curriculum of the department for the four years of study.

First Year

No.	Subject	First Semester			Second Semester			Units
		Hours			Hours			
		Theoretical	Tutorial	Practical	Theoretical	Tutorial	Practical	
GE101	Mathematics I	3	1	-	3	1	-	6
EE102	Computer I	1	1	-	1	1		2
GE103	English I	1	1	-	1	1	-	2
GE104	Fundamental of Mechanical Engineering	2	1	-	2	1	-	4
GE105	Engineering Drawing	-	1	2	-	1	2	2
EE106	Electrical Engineering Laboratories	-	1	4	-	1	4	4
EE107	Fundamentals of Electrical Engineering	3	1	-	3	1	-	6
EE108	Electronic Physics	3	1	-	3	1	-	6
EE109	Digital Techniques	2	1	-	2	-	2	5
GE110	Arabic Language	1	1	-	1	1	-	2
GE111	Sports	-	-	1	-	-	1	-
Total		16	10	7	16	9	9	39
		33			34			

Second Year

No.	Subject	First Semester			Second Semester			Units
		Hours			Hours			
		Theoretical	Tutorial	Practical	Theoretical	Tutorial	Practical	
EE201	Computer II	1	1	-	1	1	-	2
GE202	Human Rights	1	1	-	1	1	-	2
EE203	Electrical Machines I	2	1	-	2	1	-	4
EE204	Numerical Methods and Statistics	2	-	-	2	-	-	4
EE205	Electromagnetics	3	-	-	3	-	-	6
EE206	Electronics I	2	1	-	2	1	-	4
EE207	Electrical Circuits	3	1	-	3	1	-	6
EE208	Electrical Engineering Laboratory	-	2	6	-	3	6	6
GE209	Mathematics II	3	1	-	2	2	-	5
GE210	English II	1	1	-	1	1	-	2
GE211	Sports	-	-	1	-	-	1	-
Total		18	9	7	17	11	7	41
		34			35			

Third Year

No.	Subject	First Semester			Second Semester			Unit
		Hours			Hours			
		Theoretical	Tutorial	Practical	Theoretical	Tutorial	Practical	
EE301	Antenna & wave Propagation	2	1	-	2	1	-	4
EE302	Electronics II	2	1	-	2	1	-	4
EE303	Engineering Analysis	2	1	-	2	1	-	4
EE304	Electrical Power I	2	1	-	2	1	-	4
EE305	Electrical Machines II	2	1	-	2	1	-	4
EE306	Communications I	2	1	-	2	1	-	4
EE307	Electrical Engineering Laboratory	-	2	6	-	2	4	5
EE308	Advanced Microprocessor	2	-	1	2	-	2	4
EE309	Control System Design I	2	-	-	2	-	-	4
GE310	English III	1	1	-	1	-		2
GE311	Sports	-	-	1	-	-	1	-
Total		17	9	7	16	9	7	39
		33			32			

Fourth Year

No.	Subject	First Semester			Second Semester			Unit
		Hours			Hours			
		Theoretical	Tutorial	Practical	Theoretical	Tutorial	Practical	
EE401	Control Engineering II	3	0	-	2	1	-	5
EE402	Engineering Project	1	-	2	1	-	2	4
EE403	Digital System Design (DSD)	3	0	-	2	1	-	5
EE404	Communications II	2	-	-	2	-	-	4
EE405	Electrical Power II	3	0	-	2	1	-	5
EE406	Power Electronics and Special Machines	3	-	-	2	1	-	5
EE407	Computer Networks	1	1	2	1	1	2	4
EE408	Electrical Engineering Laboratories	-	2	4	-	2	6	5
EE409	Digital Signal Processing (DSP)	1	1	-	1	1	-	2
GE410	English IV	1	1		1	1		2
GE411	Sports		-	1	-	-	1	-
Total		18	5	9	14	9	11	41
		32			34			

The Syllabus

The following is the syllabus of the subjects in the department curriculum.

First Year syllabus

GE101 - Mathematics I
Limits and continuity, Transcendental functions, Differentiations and applications, Techniques of integrations, Further applications of integration, Conic sections and polar coordinates, Vectors and the geometry of space, Vector valued functions and motion in space, Determinants, Matrices.

EE102 - Computer I
Flowchart Techniques, Programming languages, how to use, run programs, Compiler overview**,** Programming in C++ (input and output)**,** Type casting functions**,** Arithmetic and logical operators, precedence of operators. Other arithmetic operations with different statements. C++ program control and structured programming selections. If statement, nested if statement, if-else if ladder else**,** Switch-case statements, nested switch-case statement. Counter controlled and sentinel-controlled repetition. Loops, for statement, for with no body and for loop variations. The do-while and while loops. Skipping loop iterations break and continue and exit () function. User defined functions creation, categorized Prototype, local, global, and static variables in functions**.** Function with no argument and no return value**,** Function with no argument but return value, Function with argument but no return value, Function with argument and return value, Recursion call a function from a same function, Function C++ return by reference, 1-D array creation, initialization and processing. 2-D array creation, initialization and processing. String - character array initialization and processing. C++ pointers/ pointer variable definitions and initialization, Relationships among pointers, arrays and strings. User defined data types, C++ structures. Using array structure to represent lists and tables of values. Union, bit manipulations and numerators. C++ programming files I/O, file operations.

GE 103 - English I
The aim of this course is to empower students with the language and life skills they need to carry out their career goals. To this end it provides ample opportunities for students to build awareness and practice language in real-life scenarios. The integrated skills approach of the course develops the student's self-confidence to survive and succeed in professional and social encounters within an English-speaking global community. The program consists of 60% General English taken from New Headway Plus [Student's Book and Workbook with key for Beginner Level] by John and Liz Soars (2010) and 40% English for Specific

Purposes taken from Electricity and Electronics by Marija Krznarić (2014). The topics to be covered throughout the academic year are Hello, Your World, All about you, Family and Friends, The Way I live, Every day, My favorites, Where I live, Times past, We had a great time, I can do that!, Please and thank you, Here and now, It's time to go!, The Engineering Profession, The Structure of Matter, The Electric Current, The Effects of an Electric Current, Electric Circuits, Conductors, Insulators, Semiconductors, Batteries and Capacitors, Process Control Systems, Machine Translation-Yes or No, From Camera to Screen, The Cathode Ray Tube, Radio Communications, and How Robots Make Our Lives Easier.

GE- 104 Fundamentals of Mechanical Engineering

Statics

1-General Principles
2-Force Vectors
3-Equilibrium of a Particle
4-Force System Resultants
5-Equilibrium of Rigid Body
6- Structural Analysis
7-Friction

Dynamics

1- Kinematics of a Particle
2- Kinetics of a Particle: Force and Acceleration
3- Kinetics of a Particle: Work and Energy
4- Kinetics of a Particle: Impulse and Momentum

Thermodynamics

1- Introduction and Definitions
2- Pressure, Energy and Applications
3- Ideal gases
4- Ideal gases Applications
5- Work and heat
6- First Law of Thermodynamics
7- Second Law of Thermodynamics

Strength of Materials

1- Introduction and Definitions
2- Simple Stress and Strain
3- Shearing Force and Bending Moment Diagram
4- Bending
5- Deflection of Beams
6- Torsion

GE105 - Engineering Drawing

See Mechanical Engineering Department Syllabus

EE106 - Electrical Engineering Laboratory

1. Experiments covering material on fundamentals of electrical engineering.
2. Experiments covering material on computer I

EE107 - Fundamentals of Electrical Engineering

Introducing the SI units. Resistance-resistivity, temperature coefficient of resistance, series and parallel connection, star/delta & delta/star transformation, ohms law, Kirchhoff's law. D.C. Network. Theorems for dependent & independent source Substitution and reciprocity theorems). Magnetic circuits, Kirchhoff's laws (Thevenin, Norton, Superposition, maximum power transfer, Millman, Hysteresis & eddy current losses. Basic electromagnetic- self and mutual inductance in D.C. circuits. Basic electrostatics- capacitors in D.C. circuits. Alternating voltage & current, single phase circuits, complex notations and phasor diagram. Network theorems for dependent and independent source. Power calculations and P.F. correction, resonance circuits and passive filters.

EE108 - Electronic Physics

Electron Ballistics; Atomic Structure and Band Theory; Electrical Conduction in Metals; Semiconductor Physics; P_N Junction: pn junction at open circuit, forward bias, diffusion & recombination current components at forward bias, reverse bias, pn junction band diagram, depletion layer capacitance, diffusion capacitance, tunneling phenomenon, avalanche and zener breakdowns, Diode Applications: the diode as a circuit element, the diode as a non-linear device, static & dynamic resistance of the diode, piece-wise linear equivalent circuits, clipping circuits, clamping circuits, rectifier circuits, voltage regulation and ripple factor, the harmonic components in rectifier circuits, Inductive filters, capacitive filters, L-section filters, π-section filters, multiple L-section filters, d.c. power supplies, regulator circuits using zener diodes, regulator circuit stability, voltage multipliers, function generation; Other Devices: light emitting diodes, solar cells, photo diodes, pin diodes, semiconductor lasers, bipolar transistor (BJT), common base dc c/cs, common base amplifier, common emitter dc c/cs, low frequency small signal model, thyristor basic c/cs, triggering the SCR, SCR turn-off, other device structures.

EE109 - Digital Techniques

Introduction to digital techniques; System of numbers; numbers base conversions, Binary representation of signed numbers; Binary arithematics; Binary Codes; BCD arithematics; Logic gates; Universal building blocks; Boolean algebra: canonical and standard forms, Karnough map and Quine Mcclusky; Arithmetic circuits; Comparator circuits and code converter; Multiplexer and demultiplexer; Encoder and decoder; Sequential logic circuit: types of Flip-Flops, counters and shift registers.

GE 110 - Arabic Language

ماهية اللغة وتطورها؛ مستويات النظام اللغوي؛ عصور الأدب العربي (الجاهلي، الاسلامي، الأندلسي، العباسي، الحديث)؛ قواعد في الإملاء؛ الضاد والظاء؛ قواعد كتابة الهمزة؛ العدد وكيفية كتابته وإعرابه؛ الفعل وأنواعه والفاعل وعمله؛ المبتدأ والخبر؛ بعض الأغلاط اللغوية الشائعة؛ دروس في بلاغة القرآن؛ ماهية الأسلوب وكيفية تغيير المعنى بتغيير أماكن اللفظ؛ علامات الترقيم

GE 111 - Sports

Second Year syllabus

EE201 - Computer II

Computer data representation systems. Unsigned integers, signed integers, floating point values. Addressing modes, visual model of microprocessor. Machines & assembly language programming for IBM PC. Computer Bus: classifications &types, timing diagram, decoding of address, computer performance measurement. MIPS, CPI, IPC, Statistics, Amdahl's law, Arithmetic Logic Unit (ALU). (Gates & MUX). CPU, example CPU: 8086/8088, 80286, 80386, 80486 & Pentium, Interfacing microprocessor, line drivers, transceivers, latches & interrupt (programmed & hardware), transducers, relay drivers, motor drivers, opt-isolators, ADC, DAC, I/O interfacing. Memory and interfacing. Instruction design, control unit design & CPU design. MCU: example PIC microcontrollers family, architecture, practical circuits.

EE 202 - Human Rights

Chapter 1: human rights.
Section 1: evolution of the concept of human rights
Section II: human rights in international conventions and covenants.
Chapter II: democracy.
Section 1: evolution of the concept of democracy.
Section II: forms of democratic governance.
Section III: democratic governance.
Section IV: the benefits of democracy.
Section v: criticisms of democracy.
Chapter III: Covenant of Caliph Imam Ali Ibn Abi Talib (peace be upon him) to his Alderman of Egypt the Companion Malik Al-Ashter (may Allaah be pleased with him)

EE 203 - Electrical Machines I

Types of transformers, principle of operation, transformer losses, ideal transformer, real transformer, transformer voltage regulation, transformer efficiency, open circuit and short circuit test, per unit calculation, three phase transformers, parallel operation of transformers, autotransformers, current and voltage transformers. General d.c. machine principle, d.c. machine construction, windings, calculation of M.M.F., armature reaction, commutation, d.c. generators, parallel operation of d.c. generators, d.c. machines losses and efficiency, principle of operation of motors, speed calculation, torque calculation, starting of d.c. motors, types of motors, speed control, testing of d.c. machines.

EE204 – Numerical Methods and Statistics

Solution of Non-linear Equations: Method of Halving the Interval (Bisection method), Method of linear Interpolation (Method of false position), Newton's Method

Solving sets of linear equations: Gauss and Gauss-Jordan methods, LU Decomposition, Gauss-Seidel Method

System of Non-Linear Equations: Newton-Raphson's Method

Numerical interpolation: Linear Interpolation, Quadratic Interpolation

Least squares date fitting: Linear Least Squares Approximation

Numerical integration: Trapezoidal rule

Numerical Differentiation

Finite difference and their application: Interpolation using newton –gregory forward polynomial, Error of Interpolation using newton –gregory backward polynomial

Numerical solution of Differentiation equations: Euler and modified Euler Method, Runge-Kutta method

Multistep methods to solve Differential Equations: Adams-Moulton method

Basic probability concepts, Random variables and probability distributions, Expectations and moments, Functions of random variables, Some important discrete distributions, Some important continuous distributions

EE205 – Electromagnetics

Vector analysis; vector algebra, vector components and Coordinate systems; Coulombs law and electric field intensity; Electric flux density, Gausses law and divergence; Energy and potential; Conductors, dielectric and capacitance; Electrostatic fields; Electromagnetic field; Maxwell's equation.

EE206 - Electronics I

BJT operation; Biasing techniques for stabilizing Q-point, in BJTs; BJT equivalent circuits: h–Parameter model, π- model and Ebers-Moll model; FET

operation; Biasing techniques for stabilizing Q-point, in FETS; FET equivalent circuits; Constant current source and level shifter Single and multi stage amplifiers; Power amplifier: class A, class B and class C amplifier; Tuned amplifier; SCR & UJT; Logic gates design; IC fabrication.

EE207 - Electrical Circuits

Two Port Networks, (Z, Y. H and ABCD) parameters and the relation between them, inter connected 2-port network; Operational Amplifier, Transfer characteristic of operational amplifier, its applications and cascaded op. amp. Circuits; Active Filters, Low pass filter (LPF) design, frequency response for amplitude LPF, High pass filter (HPF) design, frequency response for amplitude HPF, Band pass filter (BPF) design, frequency response for amplitude BPF, Band reject filter circuit and its frequency response for amplitude Band reject filter; Bode Plot, K gain factor, Integral and Derivative factors, First order factor, Second order factor and Frequency response; Routh's Stability Criterion, Locus Diagram. Mutual Inductance, Three Phase Circuits (balanced and unbalanced), Transient Analysis of First and Second Order Circuits for dc and ac, Laplace Transform and its Applications in Circuits Analysis.

EE208 - Electrical Engineering Laboratory

1. Measurement Lab.
2. DC Machines Lab
3. Multisim Lab.
4. Experiments covering material on computer II

GE209 - Mathematics II

Briefed syllabus: Multiple integrals, Infinite sequences and series, Fourier series, Partial derivatives, first order Ordinary Differential Equations (ODEs), second order Ordinary Differential Equations (ODEs), Higher Order Linear
Ordinary Differential Equations (ODEs), Systems of Ordinary Differential Equations (ODEs), Laplace Transforms (one sided).

GE 210 - English II

The course empowers students with the language

GE 211 - Sports

Third Year syllabus

EE301 - Antenna & Wave Propagation

Fundamentals of electromagnetic waves and Maxwell's equations and introduction to antenna; Isotropic point radiator and antenna parameters: Gain, efficiency, input impedance, and radiated power; Hertezian Dipole; Loop antenna; Finite length dipole: λ/4, λ/2, λ ,2λ, Nλ wavelength dipole; Array of point source; Array factor and pattern Multiplication; Hallen's equation; Methods of Moments and solution of Hallen's equation; Helical antenna; smith chart and impedance matching; Microstripe patch antenna; Microwave antennas; Reflector type antenna and radar equation; Electromagnetic waves Fundamentals and wave equation; Propagation in a lossless medium; Wave propagation in a conducting medium; Reflection by a perfect conductor; Reflection by a perfect dielectric; Radio wave propagation and polarization; Ionospheric propagation; Tropospheric scatter propagation; Ground wave propagations; Space wave and surface wave; Propagation over a plane earth; Propagation loss and power Budget calculations; Receiver input power & Receiver noise; Transmission lines; Propagation filters; Wave guides; Rectangular wave guide: TE, TEM, and TM modes.

EE302 - Electronics II

Basic IC amplifier stages at low frequencies: bias techniques for ICs, Differential amplifier using BJTs, JFETs and MOSFETs with passive and active loads, output stages; Operational amplifier characteristic using bipolar and BiMOS circuits; Frequency response of amplifiers; Feedback amplifier; Op-amp applications: linear and non
linear applications; Linear oscillators; Wave shaping and waveform generators: comparators, regenerative comparators, square wave and triangular wave generators; Multivibrators: Transistor based and IC based Multivibrators; Analog Multipliers; Phase Locked Loop (PLL).

E303- Engineering Analysis

Briefed syllabus: Signals and systems, Linear time-invariant systems, Fourier analysis for continuous-time signals and systems, Filtering, Sampling, The Bilateral Laplace transform, Z-transform.

EE304 – Electrical Power I

General background; elements of power system; Radial, Parallel, Ring and interconnected systems; transmission line constants, performance of transmission line (short, medium and long), general 2 port constants (ABCD constants); power circle diagram; Corona; overhead transmission line insulators; sag and stress

calculation; conductors types and performance of underground cables; economic operation of power system.

EE305 - Electrical Machines II

1. Introduction to machinery principles
2. AC machinery principles: generation of alternating emf, MMF of distributed windings in AC machines, MMF of distributed windings in AC machines, rotating mmf waves in AC machines,
3. Synchronous generators: construction, synchronous generator equivalent circuit and phasor diagram, power and torque, measuring model parameters, synchronous generators operating alone, parallel operation of synchronous generators and effect of salient poles
4. Synchronous motor: principle of operation and equivalent circuit, steady state synchronous motor operation, torque –speed characteristics, effect of load changes, effect of field current changes, the synchronous capacitor and starting of synchronous motor
5. Three phase induction motor: construction and basic concepts, equivalent circuit of three phase induction motor, power and torque of three phase induction motor, torque speed characteristics of three phase induction motor & starting of three phase induction motor, speed control of three phase induction motor, determination circuit model parameters of three phase induction motor and the three-phase induction generator
6. Single phase induction motor: revolving field theory and cross field theory, starting of single-phase induction motor, the circuit model of single-phase induction motor and other types of motors: reluctance motor, stepper motor.

EE306 - Communications I

Signals; Amplitude Modulation: (Normal AM, DSB-SC, SSB-SC, VSB and QAM) modulator and demodulator, AM Heterodyne receiver; Frequency Modulation: NBFM, WBFM, FM detection methods (PLL, zero crossing and frequency discriminator). FM Heterodyne receiver; Frequency Division Multiplexing (FDM); Noise: Thermal noise, noise in AM and noise in FM. Discrete modulation; Digital modulation; Baseband modulation: PCM, Noise in PCM and probability of error in PCM; DM and ADM. Time Division Multiplexing (TDM); Band pass digital communication: OOF, ASK, (PSK,BPSK,QPSK, 8PSK,16PSK), FSK, NCPFSK and CPFSK and (QAM, 8QAM, 16 QAM……. 256 QAM); B.W in digital systems; Introduction to OFDM;

EE307 - Electrical Engineering Laboratory

1. AC Machines Lab.

2. Electronics Lab.
3. MATLAB Lab.

EE308 - Advanced Microprocessor

Pipeline**,** Instruction level parallelism processors**.** Pentium processors**.** Advanced assembly language, BIOS system interrupt and BIOS function calls**.** Cache memory**.** DMA**,** Serial RAM, Flash RAM**,** Parallel processing**,** parallel computing**,** DFS: file allocation table (FAT), media format, hard drive, hard media, sector, cluster, track, CD/DVD drive, media, format (FAT, FAT32, NTFS)**,** Remote data exchange devices: **(**Bluetooth**,** IR**,** Other adapters**).** Special purpose processor, new processor: **(**Mobile processor**,** monitoring processor**).** Exploring new advances and technologies in microprocessor**.**

EE309 - Control System Design I

Introduction to control engineering and definitions of basic concepts of control systems, open-loop closed-loop control systems and their differences.
Different examples of control systems, classification of control systems, feedback characteristics and effects of feedback.
Mathematical modeling of dynamic systems: introduction, transfer function, Impulse-response function, automatic control systems
Mathematical models of physical systems: differential equations of physical systems, mechanical translation systems and gear trains.
Mathematical models of electrical systems.
Derivation of transfer functions.
Block diagram algebra
Signal flow graphs.
Mason's gain formula
Feedback characteristics of control system: effect of negative feedback on sensitivity, bandwidth, disturbance, linearization effect of feedback.
Control components: servomechanisms.
Time-domain analysis: Time domain performance criteria, characteristic equation of feedback control systems, transient response of first order systems.
- Transient response of second order systems.
- Transient response of higher order systems.
- Steady-state error and static error constant in unity feedback control system, error criteria, generalized error constant.
- Time domain specifications.
- Stability analysis in s-domain: stability and algebraic criteria, concept of stability necessary conditions of stability.
- Routh's stability criterion.
- Application of Routh's criterion to linear feedback system, Relative stability by shifting the origin in s-plane.

Root locus technique: root locus concepts.
Rules of construction of root locus.
Determination of roots from locus of specified open-loop poles and zeros, effect of adding open-loop poles and zeros on root locus.
Frequency Domain Analysis: Frequency domain specifications.
- Logarithmic plots (Bode plots).
- Example of Bode plots of a control system.

GE 310 - Sports

Fourth Year syllabus

EE401- Control Engineering II

Unit-I

FREQUENCY DOMAIN STABILITY ANALYSIS AND NYQUIST CRITERION: Introduction for frequency domain stability analysis, Poles and zeros of open loop and closed loop systems, Nyquist criterion, Nyquist plot, Relative stability.

Unit-II

DESIGN OF FEEDBACK CONTROL SYSTEMS: Introduction to design – compensation techniques – P, PI, PD and PID controllers - Lead, Lag and Lead - Lag compensation. Design of Lead, Lag and Lead-Lag compensators in time domain using root locus and in frequency domain using Bode diagrams. Design of P, PI, PD and PID controllers. Zeigler-Nichols method of tuning PID controllers.

Unit-III

NON LINEAR SYSTEMS: Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

Unit-IV

SYSTEM MODELLING USING STATE VARIABLES APPROACH FOR CONTINUOUS TIME SYSTEM: Concept of state, state variable, state vector and state space. State variable representation of continuous time systems, transfer function from the state variable model- state variable model from transfer function –Bush or companion form – controllable canonical form –observable canonical form – Jordan canonical form – Diagonalization - state diagram.

Unit-V

STATE VARIABLE ANAYSIS FOR CONTINUOUS TIME SYSTEM: Solution of linear time invariant state equation – state transition matrix – properties - computation of state transition matrix by Laplace, state transition matrix and Cayley Hamilton theorem. Response of homogeneous and non homogeneous systems. Tests for controllability and observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality.

Unit-VI

DESIGN OF MODERN CONTROL SYSTEMS: Pole-placement design, State observer design, Equivalent frequency-domain compensator, Reduced-order observer.

EE402 - Engineering Project

Prepared by the academic staff.

EE403 – Digital System Design (DSD)

Sequence generators: design and applications; Analysis and design of synchronous state machines; Analysis and design of asynchronous state machines: timing problems in sequential logic circuits; A/D and D/A converters: types of error in converters, circuits, design of open-loop and feedback techniques; Logic families: principles and characteristics of different logic families (TTL, ECL, MOSFET, and I^2L); Semiconductor memory circuits: memory classification, memory architecture, implementation and applications; Programmable Logic Devices (PLDs): principles and design of array logic circuits, mask and field PLDs, sequential PLDs, complex PLDs, VLSI FPGAs; Hardware design of microcomputers.

EE404 - Communications II

Information Theory, Source of information, Entropy, Channel capacity, Source Coding Theorem, Mathematical model of information source, Huffman coding, Shannon-Fano codes, Types of errors, Data compression. Channel Coding, Taxonomy of codes, Spread Spectrum Systems: Introduction, Types of Spread Spectrum Techniques, Direct sequence spread spectrum, Frequency hop spread spectrum, Hybrid direct sequence/frequency hop spread spectrum, & Representation of spread spectrum systems; General Principles of CDMA, CDMA Transmission Channel Models, Examples for CDMA Systems. Wireless Ad-hoc Networks: Introduction to Ad hoc networks, MAC in Ad hoc network, Routing in Ad hoc network, Clustering in Ad hoc network, Power control in Ad hoc network, QoS of Ad hoc network, Applications of Ad hoc networks; Mobile Communication Systems: The Cellular Concept System, Design Fundamentals, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Trunking and Grade of Service, & Improving Capacity in Cellular Systems.

EE405 - Electrical Power II

Evolution of electric power systems; Power system representation; Per unit system; Balanced and unbalanced faults, Symmetrical fault calculations. Symmetrical components, Unsymmetrical faults; Synchronous machine in power system; Power system stability; Power system load flow problems. Direct methods involving inversion of the nodal admittance matrix, iterative methods Gauss-Seidal method, Newton Raphson method; Power system protection including generator protection, transformer protection, and transmission line protection, different types of relay construction and operation. Grounding types.

EE406 - Power Electronics and Special Machines

Power and Electronics Relationships: Introduction to Power Semiconductor Devices: Thyristors; Triac; Diac; GTO; BJT; IGBT; MOSFET; Optocouplers. Types of firing circuits; Pulse transformers; Free Wheeling Diode; Snubber circuits; thyristor cooling. Converters: series and parallel connection of Thyristors, Thyristor Valves; controlled and uncontrolled Rectifiers; single and three-phase. Force Commutated; Line Commutation Overlap Circuits. Harmonics in Converter Circuits: Methods of Reducing Harmonics PWM Harmonics Calculation. DC to AC PWM Inverters: single and three-phase; UPS. DC choppers and SMPS. AC to AC converters: AC Voltage Controllers; Cycloconverters. Introduction to speed control of DC and AC machines. Introduction to the principles of operation of the following types of machines; Single-phase series motor; Stepper and Servo motors. Shaded-Pole-Motors; Reluctance Motor; Permanent Magnet Machines; Solid Rotor Machine; Duel Fed Induction Machine; Model of High power small size Machines using Nano technology materials.

EE407 - Computer Networks

Introduction to Computer Network, OSI model, Data flow in OSI model, Introduction to the TCP\IP model, Performance: Bandwidth, Throughput, Latency, Processing time, transmission time, Propagation time, Queuing time. Physical Layer, Data Link Layer, Network Layer, Transport Layer, Application layer, Introduction to Queuing Theory (Little's Law, m\m\1 queue, Scheduling: FIFO, Priority, Round Robin and Waited Fair Queuing WFQ), Introduction to Network Security.

EE408 - Electrical Engineering Laboratory

1. AC Machines Lab.
2. Control Lab.
3. Electronics Lab.
4. Power Electronics Lab.

EE 409 - Digital Signal Progressing (DSP)

Definition; Introduction to digital signal processing; scope of DSP; types of response; sampling and A/D conversion; basic types of digital signals; Linear-Time-Invariant (LTI) systems; impulse response of the systems; linear convolution; difference equation; Discrete Fourier Series (DFS); periodic convolution, properties of DFS; Discrete Fourier transform (DFT); circular convolution; properties of DFT; frequency response of LTI systems; inverse of

DFT; Fast Fourier Transform (FFT); Analog filter Design; type of filter responses; Butterworth and Chebyshev filters;; design procedure; Digital Filter Design; Infinite Impulse Response (IIR) filter design; Design of IIR using bilinear transformation; design of IIR using digital transformation; Finite Impulse Response (FIR) filter design; design of FIR using window method; applications of IIR and FIR filters; introduction to Orthogonal Frequency Division Multiplexing (OFDM); applications of DSP;

GE 410 - Sports

M.Sc. Course Subjects: **All Fields**

No.	Course Number	Power and Machines	Course Number	Electronics and Communication	Course Number	Computer and Control
1.	EE 501	Generalized Machine Theory	EE 522	Microelectronics Engineering	EE 541	Optimal Control
2.	EE 502	Machine Design	EE 523	Nano Technology and applications	EE 542	Digital Control Systems
3.	EE 503	Power Electronics	EE 524	Reversible and Quantum Computing	EE 543	Non-Linear Control
4.	EE 504	AC. and DC. Drives	EE 525	Advanced Digital System Design (ADSD)	EE 544	Robust Control
5.	EE 505	Special Purpose Machines	EE 526	Digital Communication I	EE 545	Image Processing
6.	EE 506	Power System Components Modeling	EE 527	Digital Communication II	EE 546	FPGA
7.	EE 507	Power System Control	EE 528	Data Communication and Networks	EE 547	Petri-Net Technique
8.	EE 508	Power System Dynamics	EE 529	Optical and satellite Communications	EE 548	Advanced Operating Systems
9.	EE 509	Power System Protection	EE 530	Optoelectronics Engineering	EE 514	Optimization Techniques
10.	EE 510	Power System Reliability	EE 531	Microwave and Telecommunication Engineering	EE 515	Modern Control Theory
11.	EE 511	Power System Stability	EE 532	Advanced Digital Signal Processing (ADSP)	EE 532	Advanced Digital Signal Processing (ADSP)
12.	EE 512	Reactive Power Control (R.P.C.)	EE 533	Advanced Computer Networks	EE 533	Advanced Computer Networks
13.	EE 513	Optimal Power Flow	EE 534	Wireless Networks	EE 534	Wireless Networks
14.	EE 514	Optimization Techniques	EE 535	Mobile Communication System	EE 535	Mobile Communication System
15.	EE 515	Modern Control Theory	EE 536	Statistical DSP	EE 536	Statistical DS

16.	EE 516	Computer Aided Design in Power System	EE 537	Advanced Microprocessors	EE 537	Advanced Microprocessors
17.	EE 517	Artificial Intelligence (A.I.)	EE 538	Embedded System Design	EE 538	Embedded System Design
18.	EE 518	Expert Systems	EE 517	Soft Computing	EE 517	Soft Computing
19.	GE 519	Mathematics	GE 540	Advanced Mathematics	GE 540	Advanced Mathematics
20.	GE 520	English (1st Semester)	GE 520	English (1st Semester)	GE 520	English (1st Semester)
21.	GE 521	English (2nd Semester)	GE 521	English (2nd Semester)	GE 521	English (2nd Semester)
22.			EE 541	RF Circuit Design I		
23.			EE 542	RF Circuit Design II		

Note: SIX subjects plus English will be selected for each Semester.

M.Sc. Course Subjects: All Fields
1st Semester 2017-2018

No.	Course Number	Power and Machines	Course Number	Electronics and Communications	Course Number	Computer and Control
1.	EE 501	Generalized Machine Theory	EE 525	Advanced Digital System Design (ADSD)	EE 533	Advanced Computer Networks
2.	EE 515	Modern Control **Theory**	EE 526	Digital Communication I	EE 541	Optimal Control Systems
3.	EE 503	Power Electronics	EE 541	RF-Circuit Design I	EE 547	Petri-Net Technique
4.	EE 514	Optimization Techniques	EE 514	Optimization Techniques	EE 514	Optimization Techniques
5.	GE 540	Advanced Mathematics	GE 540	Advanced Mathematics	GE 540	Advanced Mathematics
6.	EE 511	Power System Stability	EE 536	Statistical DSP	EE 536	Statistical DSP
7.	GE 520	English (1st Semester)	GE 520	English (1st Semester)	GE 520	English (1st Semester)

للعام الدراسي 2017-2018 للفصل الدراسي الثاني

M.Sc. Course Subjects: All Fields
2nd Semester 2017-2018

No.	Course Number	Power and Machines	Course Number	Electronics and Communications	Course Number	Computer and Control
1.	EE 509	Power System Protection	EE 534	Wireless Networks	EE 534	Wireless Networks
2.	EE 504	AC. and DC. Drives	EE 530	Optoelectronics Engineering	EE 537	Advanced Microprocessors
3.	EE 542	Digital Control Systems	EE 531	Microwave and Telecommunication Engineering	EE 542	Digital Control Systems
4.	EE 512	Reactive Power Control (R.P.C.)	EE 524	Reversible and Quantum Computing	EE 546	FPGA
5.	EE 505	Special Purpose Machines	EE 542	RF Circuit Design II	EE 543	Non-linear Control
6.	EE 517	Artificial Intelligence (A.I.)	EE 530	Optoelectronics Engineering	EE 517	Artificial Intelligence (A.I.)
7.	GE 521	English (2nd Semester)	GE 521	English (2nd Semester)	GE 521	English (2nd Semester)

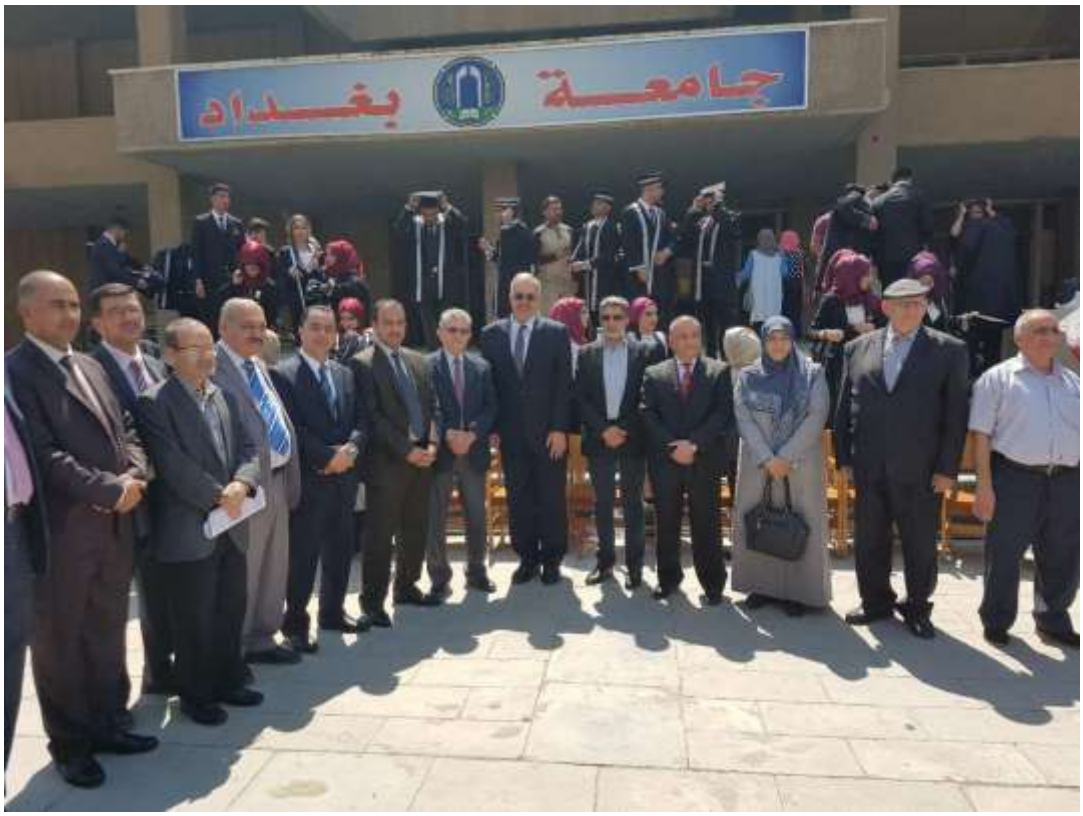
PhD. Course Subjects: **All Fields**

No.	Course Number	Power and Machines	Course Number	Electronics and Communication	Course Number	Computer and Control
	GE601	Advanced Mathematics	GE601	Advanced Mathematics	GE601	Advanced Mathematics
2.	EE602	Advanced Applied Electromagnetics	EE621	Adaptive DSP	EE635	Computer Security Course
3.	EE603	Advanced Electrical Drive	EE622	Advanced Optical Communications	EE636	Computer Vision
4.	EE604	Advanced Electrical Machines	EE623	Advanced Mobile and Communications and Networking	EE637	Multimedia
5.	EE605	Advanced Power Electronics	EE624	Optimization Techniques	EE638	Multi rate DSP
6.	EE606	Flexible A.C. Transmission System (FACTS)	EE625	Coding and data compression	EE610	Nonlinear Control System
7.	EE607	Generalized Machine Theory II	EE626	Research Methodology	EE639	Optimal Control Theory
8.	EE608	High Voltage Engineering	EE627	Adaptive Signal Processing	EE640	Discrete Event Simulation
9.	EE609	Nonlinear Control System	EE628	Advanced digital system design	EE621	Adaptive DSP
10.	EE610	Optimal Power Flow	EE629	Advanced Photonic Engineering	EE641	Fractional Control
11.	EE611	Power Plant Control	EE630	Coding theory	EE642	Reversible & Quantum Computations
12.	EE612	Power System Operation	EE643	Pattern Recognitions	EE643	Pattern Recognitions
13.	EE613	Power System Planning	EE631	Digital IC design	EE644	System & Identification
14.	EE614	Advanced Reactive Power Control	EE632	Image Radar		
15.	EE615	Soft Computing	EE633	Microwave Device + Wireless Communications		
16.	EE616	The Smart Grid	EE634	Multirate Digital Signal Processing		
17.	EE617	High Voltage Direct Current				

		Transmission (HVDC)				
18.	EE618	Multivariable and Robust Control				
19.	GE 619	English (1st Semester)	GE 619	English (1st Semester)	GE 619	English (1st Semester)
20.	GE 620	English (2nd Semester)	GE 620	English (2nd Semester)	GE 620	English (2nd Semester)

Notes:

1. SIX subjects plus English will be selected for each Semester. The PhD study is suspended for this academic year and will be resumed soon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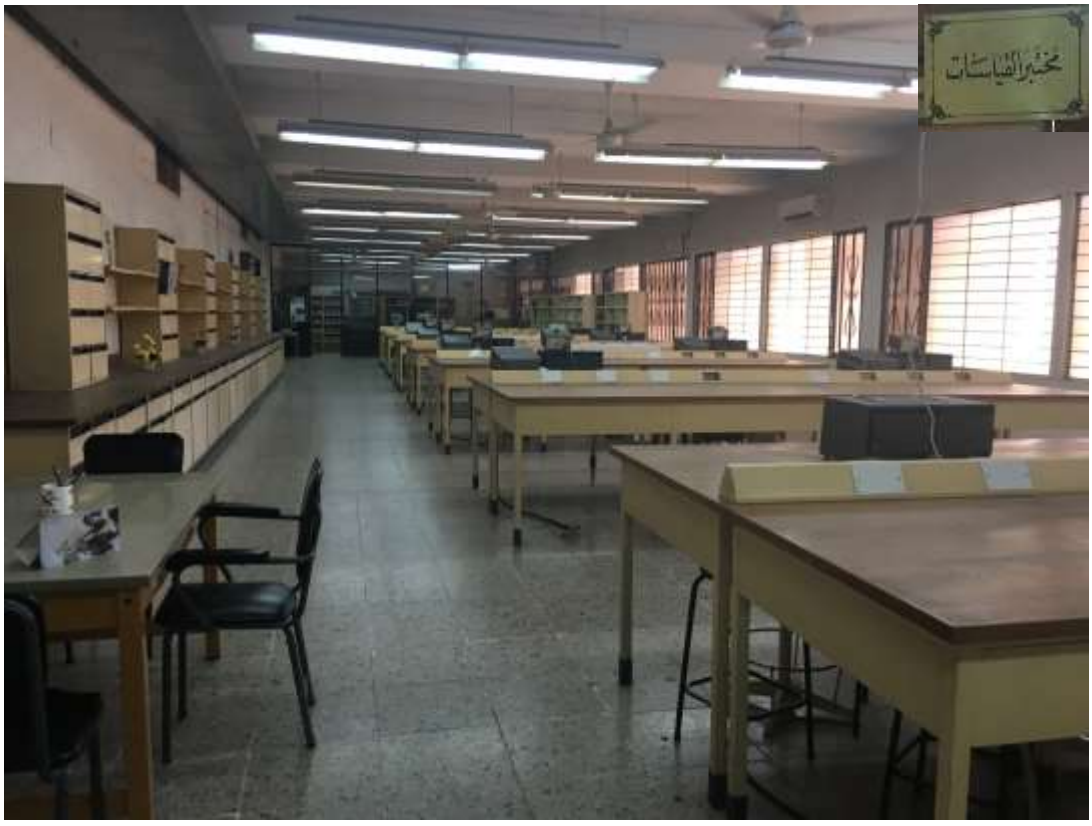
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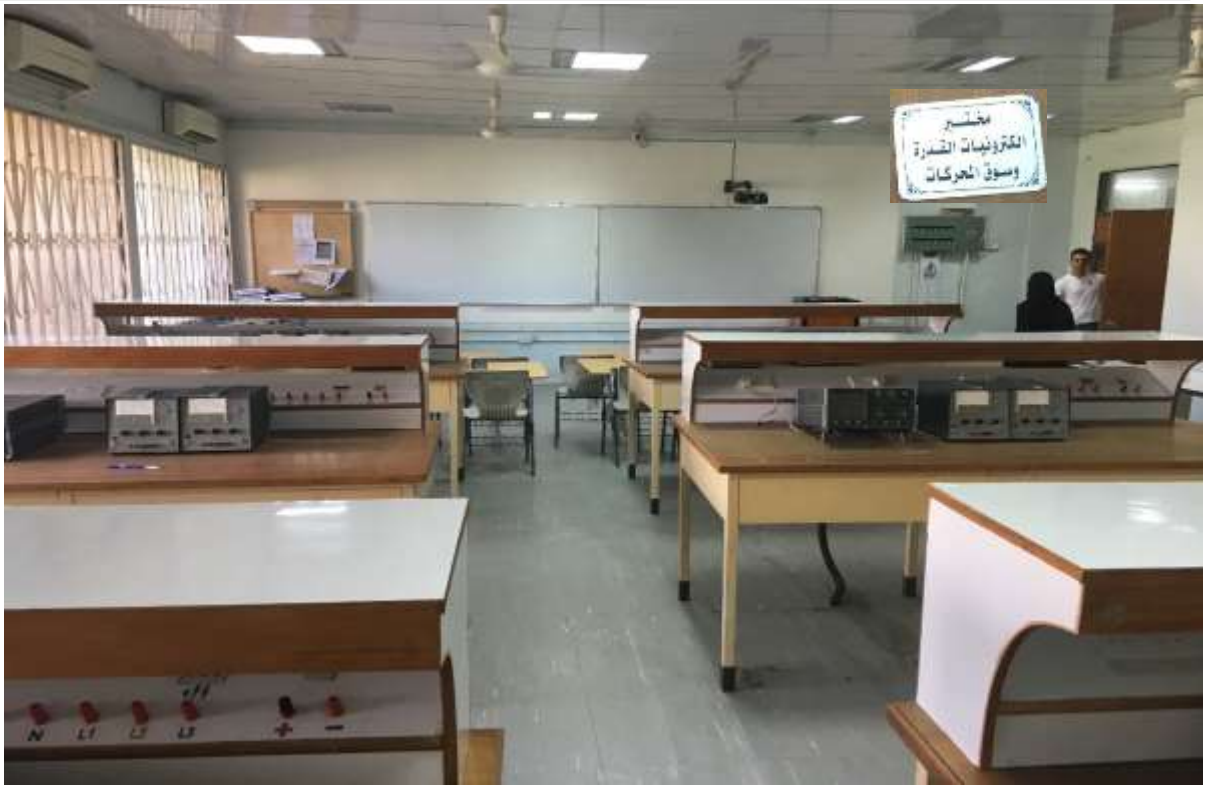
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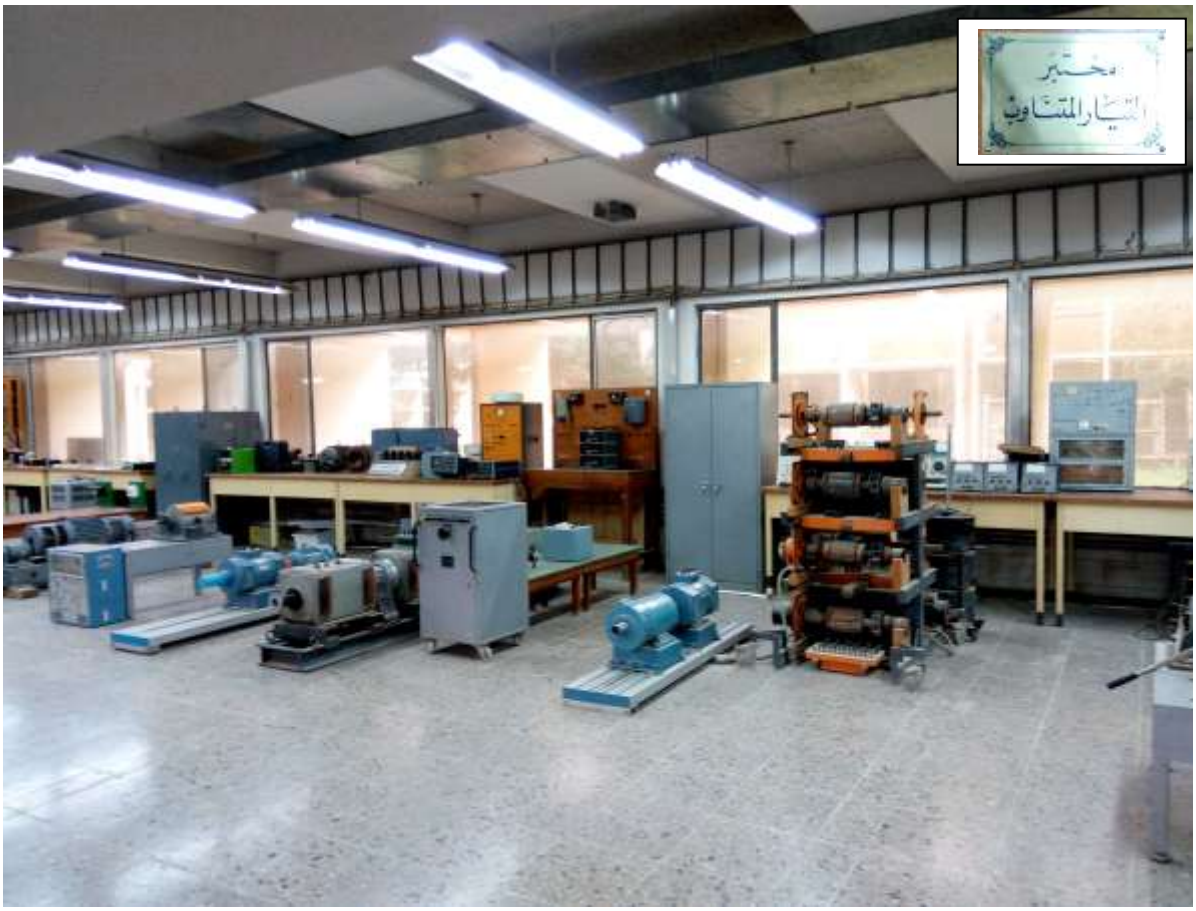
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