Hijjawi Faculty for Engineering Technology
Electronic Engineering Department
Courses Description

1. ELE 205: Communication Skills (3 Credit Hours)
Understanding of how communication works; Specific techniques for avoiding communication pitfalls; Tips and tools for improving communication at the individual and team level; A proven process for developing and delivering presentations; Principles of organizing, developing, and writing personal and technical information.
Pre-requisites: EPE 203

2. ELE 250: Electronics I (3 Credit Hours)
P-N junction diodes; DC and AC diode applications, DC regulated power supplies. Bipolar junction Transistors; (construction, operation, characteristics, biasing and stability). CB, CE, and CC, Amplifiers, DC and AC analysis, and design, two-port model approach. Field effect transistors (construction , operation, characteristics, and biasing), CS, CD, and CG amplifiers; DC and AC analysis, and design , two-port model approach.
Pre-requisites: EPE 220

3. ELE 251: Electronics I Lab (1 Credit Hours)
Diode characteristics (Si diodes, Zener diode, and LED), small and large signal diode circuits, rectification and regulation circuits, clippers and clampers, BJT characteristics (CB, CE and CC), BJT and JFET AC- parameters, biasing of BJT and JFET circuits, BJT- appliers, JFET amplifiers.
Pre-requisites: ELE 250

4. ELE 340: Introductory Semiconductor Electronics (3 Credit Hours)
Semiconductors, crystalline structure, introduction to quantum concepts and atomic spectra, band
theory of solids, intrinsic and extrinsic semiconductors, mobility, conductivity and resistivity, recombination processes, diffusion of excess carriers, p-n junctions, bipolar junction transistor (BJT),BJT characteristics field effect transistors (FETs), JFET and MOSFET characteristics, DMOS and EMOS.
Pre-requisites: ELE 250

5. ELE 350: Electronics II (3 Credit Hours)
Compound configurations: devices (Darlington and feedback pairs), Circuits (cascode and cascade amplifiers, differential amplifiers and current sources), Operational Amplifiers: Construction Operation , Characteristics and Applications. Frequency response of amplifiers, Power amplifiers: (class A, class B, class AB and class C amplifiers, and distortion in power amplifiers), Feedback circuits and Oscillators; (RC Oscillators , LC Oscillators, Relaxation oscillators).
Pre-requisites: ELE 250

6. ELE 351: Electronics II Lab (1 Credit Hours)
Linear applications of ideal operational amplifiers, direct-coupled amplifiers and RC multistage amplifiers, frequency response of RC coupled amplifiers, Darlington pairs and cascaded amplifiers, current sources and current mirrors, differential amplifiers, power amplifiers, regulated power supply. Pre-requisites: ELE 350

7. ELE 352: Electronic Design & Manufacturing (2 Credit Hours)
Introduction to Electronic Design. PWB-Design Phase: Manual(Layout drawing methods and considerations, Artwork drawing, Drill plan drawing, Master _lm),Automatic(CADD and Photo Plotting Imaging System).PWB Fabrication Phase: Manual processes (UV

exposuring , developing, etching, Stripping, drilling, assembly, soldering), Automatic processes (CAM and Isolation Routing using CNC Machines)Post-testing, packaging and documentation.
Pre-requisites: ELE 350

8. ELE 353: Electronic Design & Manufacturing Lab (1 Credit Hours)
Introduction and Safety (Electrical and Chemical). Circuit Testing (breadboarding and simulation). Manual design (Layout drawing methods and Master _lm generation techniques),Automatic (CADD and Photo Plotting Imaging System).Fabrication processes (UV exposuring , developing, etching, Stripping, drilling, assembly, soldering), Automatic processes (Isolation Routing using CNC Machines)Post- testing, packaging and documentation.
Pre-requisites: ELE 353

9. ELE 440: Opto-Electronics (3 Credit Hours)
Light emitting diodes (LEDs) (materials, construction, response time, LED driving circuitry), lasers (basic principles, laser action in semiconductors, laser modes), photodetectors (basic principles, PIN photodetectors, heterojunction and Schottky barrier photodiode, noise in photodetectors), optical waveguide (planer dielectric waveguides optical fiber waveguides).
Pre-requisites: ELE 340A

23. ELE 441: Optoelectronic Lab (1 Credit Hours)
Coherent and non-coherent light, LED characteristics, laser characteristics, p-n photodiodes, avalanche photodiodes, phototransistor and opto-couplers, CCD devices, noise in photodiodes, fiber optic system. Prerequisite: ELE 440.
Pre-requisites: ELE 440

10. ELE 450: Digital Electronics (3 Credit Hours)
Characteristics of digital signal, characteristics of digital gates, logic families (RTL,DTL,TTL,STTL, LSTTL, ALSTTL, other TTL gates. ECL, NMOS, and CMOS) , CMOS tri-state gates, comparison and interfacing of logic families, timing circuits (discrete, integrated and digital), semiconductor memory organizations (ROM, EPROM, EEPROM, static RAM, dynamic RAM)
Pre-requisites: ELE 251

11. ELE 451: Digital Electronics Lab (1 Credit Hours)
Logic families' transfer characteristics, propagation delay and power dissipation for simulated RTL, DTL, TTL NAND gates and NOR/OR ECL gates. Inverter simulation & MOSFET Parameters. Interfacing of logic families, Timing circuits, ROM and RAM experiments. Design Project.
Pre-requisites: ELE 451

12. ELE 452: Linear Integrated Circuits (3 Credit Hours)
Introduction to ICs; Operational Amplifier Fundamentals: basic building blocks, the ideal op amp, basic configurations, the virtual-short concept; Linear Op Amp Circuits: voltage amplifiers, instrumentation amplifiers, V/I and I/V converters, integrators and differentiators; Practical Op - Amp Limitations; Nonlinear Circuit Applications: voltage comparators, Schmitt triggers, precision rectifiers, peak detectors; Other Linear ICs and Applications: V/F and F/V converters, log/ antilog amplifiers, analog multipliers, D/A and A/D converters.
Pre-requisites: ELE 350

13. ELE 453: Linear Integrated Circuits Lab (1 Credit Hours)
Op amp characteristics; linear applications: voltage amplifiers, instrumentation amplifiers, V/I and I/V converters, integrators and differentiators; Nonlinear Applications: voltage comparators, Schmitt triggers, precision rectifiers, peak detectors; Other Linear ICs and

applications: V/F and F/V converters; mini projects: e.g, design of multistage amplifiers, TTL logic probe.
Pre-requisites: ELE 452A

14. ELE 454: Specialized Measurements (3 Credit Hours)
Introduction to process control, Transducers and sensors and their interfaces: Thermal sensors, mechanical sensors, flow sensors, optical sensors, Other sensors. Interface circuits and transducer signal amplification and processing, Complete systems design procedure.
Pre-requisites: ELE 452

15. ELE 455: Specialized Measurements Lab (1 Credit Hours)
Displacement and angular measurements, liquid flow measurements, PH, humidity, and conductivity measurements, pressure measurements, thermal sensors and its measurements, velocity measurements, optical transducers, spectral analysis.
Pre-requisites: ELE 454

16. ELE 456: Electronics III (3 Credit Hours)
Tuned amplifiers (synchronous and stagger TA, cascaded TA, and impedance matching). Passive and active filters (Butterworth, Chebyshev, and elliptical filters). Switched capacitors circuits.
Pre-requisites: ELE 454

17. ELE 457: Electronics III Lab (1 Credit Hours)
Feedback amplifiers, RC phase shift oscillators, LC and crystal oscillators, waveform generators, active filters inductance simulation, Switched-capacitor circuits, tuned amplifiers (staggered and syn chronous), analog multipliers, and mini projects. .
Pre-requisites: ELE 454

19. ELE 548: Advance Optoelectronics (3 Credit Hours)
Advanced Optoelectronics:- Compound semiconductors; heterostructures, quantum wells, super-lattices, quantum wires and quantum dots; integrated photonic devices. Nano-scale photonic devices. Innovative optoelectronic devices and optical interconnects.
Pre-requisites: ELE 440

20. ELE 544: Optical Fiber Technology (3 Credit Hours)
Light wave fundamentals, optical transmitters and detectors, optical waveguides, optical fiber waveguide, couplers and connectors, distribution systems, fiber design, manufacturing, install and maintenance.
Pre-requisites: ELE 440

21. ELE 546: Advanced Semiconductor Electronic Devices (3 Credit Hours)
Heterojunctions, high electron mobility transistor (HEMT), heterojunction bipolar transistor (HBT), quantum well structures and devices, semiconductor lasers.
Pre-requisites: ELE 340

22. ELE 551: Electronic Maintenance Lab (1 Credit Hours)
Introduction and safety, types of maintenance, importance of using operating and maintenance manuals. Using calibrated test equipments. Knowledge of component parameters. Corrective maintenance strategy (fault diagnosis, identifying the causes, rectifying and checking). Component testing, in-circuit testing.
Pre-requisites: ELE 351

23. ELE 552: Analog and Mixed Linear ICs (3 Credit Hours)

BJT /MOS Technologies. Large-signal and small-signal transistor models. Device characterization. Analog subcircuits. IC design: amplifiers, comparators, op amps. D/A and A/D converters. Analog systems. Computer-aided design.
Pre-requisites: ELE 452A

27. ELE 574: Applications of Microcontrollers and PLCs (3 Credit Hours)
Review of PIC's architectures, review of PIC programming, Review of Transducers and measurements, and the following PIC Applications: Measurements and control using PIC. Data transmission to PC using PIC (Parallel, RS232, Bluetooth, etc). Data transmission using GSM and GPRS. Complete system (Measurement of a variable, processing the signal, displaying the signal, sending the data using any of the above protocols) .
Pre-requisites: ELE 450

28. ELE 575: Applications of Microcontrollers and PLCs Lab (1 Credit Hours)
Using PIC simulation tools, PIC Programming and debugging procedure, Simple PIC application, Temperature and light measurements using PIC, Memory interface with PIC, PC interface with PIC, GSM phone interface to PIC, Complete application 1: sensor to PIC, data processing , and control of some other system . Complete application 2 which includes sensor interface with PIC, data display, storing data, and sending data to GSM interface or to PC.
Pre-requisites: ELE 454

29. ELE 576: Industrial Electronics (3 Credit Hours)
Basic ON and OFF control devices , Thermal, Optical and Magnetic transducers and signal conditioning circuitry, Application of pulse and timing control circuits. Introduction to unijunction transistors, Introduction to thyristor control circuits, Power sources, Analog and Digital motor's control circuitry, Introduction to automated machine technology and robotics
Pre-requisites: ELE 574

30. ELE 578: Industrial Automation (3 Credit Hours)
Automation Principles and Strategies, Production system Facilities and support Systems Manufacturing Industries Operations and products, Production Concepts and Mathematical Models ,Coast of Manufacturing Operations ,Advanced Automation Functions, Level of Automation, Computer Process Control and their Forms, Sensors, Actuators, Numerical Control, NC Technology, DNC, Robot Control Systems, Industrial Robot Applications, Engineering Analysis of Industrial Robots. Pre-requisites: ELE 574

31. ELE 590: Selected Topics (3 Credit Hours)
Selected topics will be announced by the department
Pre-requisites: Departmental supervision

32. ELE 598: Graduation Project (3 Credit Hours)
Theoretical investigation and practical implementation of special projects under the supervision of an academic member of the faculty.

Communications Engineering Department
Course Description

CME 312B: Signals and Systems (3Credit Hours)
Continuous and discrete time signals and systems, continuous and discrete time convolution, continuous and discrete LTI systems, Fourier analysis for continuous-time signals, properties and applications of Fourier transform, Laplace transform and z-transform. Prerequisite: CME 220.

CME 314A: Probability and Random Processes for Engineering (3 Credit Hours)
Probability, random variables, probability distribution and density functions, multiple random variables, random processes, spectral properties of random processes and response of linear systems to random input. Introduction of the linear mean square estimation. Engineering applications (communications in noise, data compression, radar). Prerequisite: CME 312B.

CME 456: Communications Systems.
Fourier transform, power spectral density, AM and FM modulation and demodulation, baseband modulation and demodulation, sampling, quantization, PAM and PCM modulation, bandpass modulation: FSK,PSK,ASK

CME 457: Communications Systems Lab.
AM modulation and demodulation, FM modulation and demodulation, sampling technique, PAM modulation ,PCM modulation, FSK and PSK.
Prerequisite CME 456.

CME 568A: Mobile Communication Systems (3 Credit Hours)
Introduction, mobile communication systems and standards, mobile radio propagation, large scale path loss and small scale multi-path fading, Doppler spread, delay spread and coherence bandwidth, coverage techniques and cellular concept, modulation techniques for mobile radio, access techniques spread spectrum and diversity. Prerequisite: CME 452

Computer Engineering Department
Course Description

CpE 230 Digital Logic Design (3 Credit Hours)
Fundamentals of digital electronics, Binary number system; Boolean algebra, logic gates, digital circuit analysis, gate-level and block level design of combinational digital circuits: adders/subtractors, comparators, multiplexers, decoders. Analysis, design and applications of sequential logic circuits: flip-flops, registers, counter, and their design procedures, memory elements: RAM and ROM.
Prerequisite: Math 152 .

CpE 231 Digital Logic Design Lab (1 Credit Hours)
Hands-on experience on topics that are theoretically covered in the digital logic design course, basic logic gate experiments, combinational logic circuits experiments, and sequential logic circuits experiments. The experiments on all topics vary from functional troubleshooting to gate and block level design implementation.
Prerequisite: CpE 230.

CpE 250: Object Oriented Programming Design (4 Credit Hours : 3 Theory + 1 Lab)
Overview of OOP language, Object Oriented Programming methodologies, Classes and data abstraction, Constructors and destructors, Operator Overloading and conversions, Subclasses and Inheritance, Virtual functions and polymorphism, Templates and Exception handling. Hands-on experience on theoretical engineering topics in a comprehensive application laboratory

Prerequisite: CS 101

CpE 344A: Microprocessor and microcontroller Systems Design (3 Credit Hours)
Introduction to microprocessors and Microcontrollers, Embedded Controllers and application, Instruction Set and Register Set for microprocessors and microcontrollers, programming microprocessors and microcontroller, microprocessor and microcontrollers Hardware Configuration, Resets and Interrupts, Clock and Timer Systems, Memory maps, Analog-To-Digital (A/D) and Digital- To analog (D/A), Converters, parallel interfacing , serial interfacing, microprocessor and microcontroller applications.
Prerequisite: CpE230.

CpE 345A: Microprocessor and Microcontroller Systems Laboratory (1 Credit Hours)
This is a one credit hour lab, which comes as hands-on experience on topics that are theoretically covered in the microprocessor and microcontroller design course. During this lab course, the student utilizes a real 8-bit microprocessor and microcontrollers, different types of application, ranging from sensing simple environment parameter such temperature to controlling simple systems using closed loop controller such as room temperature.
Prerequisite: CpE 344+ CpE 231.

Electrical Power Engineering Department Course Description

EPE 202: Engineering Drawing (2 Credit Hours)
Introduction, drawing instrument, dimensioning techniques, engineering geometry, representation of space relationships: two and three dimensional, multi-view representation for design and product development, orthographic drawing and projection, pictorial drawing and sketching, orthographic views, applications using AUTO CAD. Prerequisite: None.

EPE 203: Engineering Workshop (2 Credit Hours)
Introduction. Engineering materials and their properties. Casting processes. Working (forming process, marking out and measuring tools, carpentry, machining process). Joining of materials (riveting, welding). Introduction to electrical workshop components and requirements, definition of electric shock, prevention of electrical hazards, first aid for electric shock and fire safety , low voltage cables, fuses and circuit breakers, testing the continuity of electric circuits, basics of car electrical system (battery, ignition system, start motor, generator and regulator). Prerequisite: EPE 202.

EPE 220: Electric Circuits I (3 Credit Hours)
System of units, circuit variables (charge, current, voltage, power, energy). Circuit elements, and simple resistive circuits. Techniques of circuit analysis. The ideal operational amplifier, inductance and capacitance. Natural and step responses of first order RL and RC circuits. Natural and step responses of RLC circuits.
Prerequisite: CS 102.

EPE 222: Electric Circuits II (3 Credit Hours)
Sinusoidal steady state analysis. AC power analysis (instantaneous, average power, maximum power transfer, complex and apparent power, power factor and power factor correction. Analysis of three-phase circuits. Mutual inductance and magnetically coupled circuits. Resonance circuits. Frequency response using Bode plots. Two-Port networks.
Prerequisite: EPE 220.

EPE 223: Electric Circuits Lab. (1 Credit Hours)
Measuring devices (Ammeter, Voltmeter, Oscilloscope), DC circuit analysis (Ohm`s law, KCL, KVL, current division, voltage division, series/parallel combinations of resistors, wheatstone bridge, Thevenin`s and Norton`s equivalent circuits, maximum power transfer), RLC components and their frequency dependence, frequency resonance of RL and RC Circuits, phase measurements using the oscilloscope, series sinusoidal circuits, parallel sinusoidal circuits, series-parallel sinusoidal circuits, Thevenin`s theorem and maximum power transfer, resonant circuits, frequency response of filters (low-pass, high-pass, Band-pass). Prerequisite: EPE 222.

EPE 310 : Project Management and Quality Control (3 Credit Hours)
Introduction to project management. Types of projects. Engineering projects. Stages of project. Project appraisal. Contractor evaluation process. Project planning and scheduling. Bar chart and critical path method. Company structure and fund raising. Cost analysis and management, risk management. Quality control. Importance of quality control. Industrial processes and quality control. Methods of quality control. Prerequisite: EPE 203.

EPE 320: Control Systems Analysis (3 Credit Hours)
Modeling of dynamic systems. Transient behavior and stability analysis of feedback control systems. Steady-state behavior, robustness, and sensitivity, achievable closed-loop maps and design of linear feedback systems, simple feedback types (P,I,D,PI,PD,PID), Routh stability criterion, root locus analysis and design, frequency response, relation between bandwidth and rise time, Nyquist theorem, Gain and phase margins.
Prerequisite: EPE 223.

EPE 321: Control Systems Laboratory (1 Credit Hours)
Practical applications on transient and steady state behaviors of simulated and actual systems: servo, flow, and temperature, sampled data system. Controller design (P, I, D, PI, PD, PID, and two-position), Ziegler-Nichols design approach, and CASSY PC interface to control systems.
Prerequisite: EPE 320.

EPE 354: Electrical Machines (3 Credit Hours)
Dc machinery fundamentals, internal generated voltage and torque equations, dc generators, parallel operation and power flow in dc machines, dc motors: starting and speed control, single-phase transformers: introduction, equivalent circuit and performance, three- phase transformer and connections, ac machine fundamentals and rotating magnetic field, induced voltage in ac machines, three- phase induction motors: instruction and principle of operation, equivalent circuit, torque equation, starting, speed control and braking, synchronous generators and motors: construction,

Department of Biomedical Systems and Informatics Engineering
Course Description

BME 390 Biomedical Signal Processing (3 Credit Hours);

Acquisition and sampling of biosignals; Shannon's Theorem; continuous and discrete time signals, z-transform, FIR and IIR filters, Fourier series and Fourier transform, power spectrum estimation, filter techniques for modeling biomedical signals, noise

removal and signal compensation. Introduction to computer aided ECG processing, EEG-processing in the time and frequency domain; signal averaging of EP's.
Prerequisite: CME 312

BME 422 Concepts of Medical Imaging (3 Credit Hours)

Diagnostic Ultrasound Imaging, Magnetic Resonance Imaging (MRI), Radiographic Imaging Systems, Emission Imaging systems, Comparison of Imaging modes.
Prerequisite: BME 380