Course Code	CEN211	Course Name	Logic Design
No. of Credit	4	Level	3
Prerequisites	none		
Course Description	Topics covered in this course include: Digital computer and information (numbering systems, arithmetic operations, decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, simplification, CMOS circuits), combinational logic design (design procedure, Decoders, multiplexers, binary adders and subtracters), Sequential circuits (Latches, Flip flops, Synchronous Sequential circuits analysis and design), analysis and design of synchronous sequential machines: Representation, state reduction and realization; Finite state machines.		
Text Book	M. Mano & Charles R. Kime, Logic and Computer Design Fundamentals.		

Course Code	ELE201	Course Name	Fundamentals of Electric Circuits
No. of Credit	3	Level	3
Prerequisites	none		
Course Description	Basic circuit elements and concepts, Basic laws of circuit theory, Ohm's law, Kerchoff'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 active, reactive, and complex power, power factor.		
Text Book	Nilsson, "Electric Circuits", Addision Wesley, 10th edition.		

Course Code	CEN225	Course Name	Computer organization and assembly language
No. of Credit	3	Level	4
Prerequisites	CEN211		
Course Description	Introduction to the basic organization of the computer and how it works. The internal organization of personal computers based on Intel's x86. A general review of the programming in assembly language. Data representation. The representation of numbers in the computer. And numbering systems. List of commands in assembly language. Call statements and its situations. Matrices and stacks. Procedure definition. Variables and return orders. Self-recursion. Definition and word processing, orders and define the structural data. Definition and epitaxial epitaxial appeal. Input and output, including interrupts. Interface with the higher programming languages such as C. A real project application.		
Text Book	• Essentials of Computer Organization and Architecture, third edition, by Linda Null & Julia Lobur. Jones & Bartlett Learning, 2010. ISBN: 1449600069. • Assembly Language Step-by-Step: Programming with Linux, third edition, by Jeff Duntemann. Wiley, 2009. ISBN: 0470497025.		

Course Code	ELE203	Course Name	Electromagnetic
No. of Credit	3	Level	4
Prerequisites	MATH102 + PHYS101		
Course Description	Static electricity: strength, field, flux, voltage, current, energy and power. Magnetism, the nature of the waves, propagation of electromagnetic waves in vacuum, antennas.		
Text Book	Guru, Bhag Singh, and Hüseyin R. Hiziroglu. Electromagnetic field theory fundamentals. Cambridge university press, 2004.		

Course Code	CEN326	Course Name	Computer Architecture
No. of Credit	3	Level	5
Prerequisites	CEN225		
Course Description	Review of logic design principles. History of computers. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.		
Text Book	• Patterson & Hennessy, "Computer Organization and Design, the hardware/software interface," Mogan Kaufmann. • M. Mano, "Computer System Architecture," Prentice Hall.		

Course Code	ELE312	Course Name	Electronics(1)
No. of Credit	4	Level	5
Prerequisites	ELE201		
Course Description	PN junction diode: basic structure, I-V characteristics, large and small signal models. Bipolar junction transistor (BJT): basic structure, modes of operation, dc biasing, large and small signals models, single stage BJT amplifiers. Field effect transistor (FET): structure and operation of enhancement MOSFET, I-V characteristics, dc biasing. Linear and nonlinear applications of op-amp. Current mirror. Negative and positive feedback. CMOS logic gates and pass transistor logic gates. Dynamic logic.		
Text Book	Sedra and Smith, "Microelectronic Circuits", Oxford University Press, 1997		

Course Code	CEN342	Course Name	Introduction to Data Transmission
No. of Credit	4	Level	6
Prerequisites	ELE301		
Course Description	Introduction to communication systems: wired & wireless, coaxial cables, optical fiber, microwave and satellite channel. Transmission Impairments: Noise, attenuation, phase and envelope distortion, non-linearity; Data encoding: AM, PM and FM modulations, NRZ, Biphase and differential codes, PCM, DPCM and DM, ASK, FSK, PSK and M-ary signal; Data Multiplexing: FDM and TDM, Statistical TDM, spread spectrum, T1 & E1, SONET/SDH; Data Communication Techniques: HDX, FDX, Asynchronous and synchronous transmission; Interfacing techniques and protocols: EIA 232, V.24, X.21 standards; Data transmission over telephone		
Text Book	" Data & Computer Communications " W. Stallings chapters : 1-4 , 6-7		

Course Code	CEN433	Course Name	Microprocessor systems
No. of Credit	4	Level	6
Prerequisites	CEN326		
Course Description	Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips and LSI technology; Supporting chips (Buffers, decoders, system clock generator, reset system); Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique, I/O techniques: Interrupts, Direct memory access; System development and design tools techniques: hardware, and software.		
Text Book	• Clements, Alan. Microprocessor systems design: 68000 hardware, software, and interfacing. PWS Publishing Co., 1992. • Mitchell, Richard James. Microprocessor Systems: An Introduction. Palgrave Macmillan, 1995.		

Course Code	CEN444	Course Name	Computer Networks (1)
No. of Credit	3	Level	6
Prerequisites	CEN342		
Course Description	Introduction to computer networks: Network topologies; Network architecture and the OSI reference model; Data Link Control: flow control and error control, ARQ Stop/wait , Sliding window protocols, DLC standards : HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, HUBs, Ethernet Switches; Network Layer Services: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.		
Text Book	Computer Networks By A. Tanenbaum.		

Course Code	CEN445	Course Name	Computer Networks (2)
No. of Credit	4	Level	7
Prerequisites	CEN444		
Course Description	Network Layer Protocols: Optimality principle, Routing Algorithms: Flow based, Distance Vector, Shortest Path, Broadcast; Congestion control Algorithms: Leaky Bucket, Traffic Shaping, congestion control in ATM; Internetworking Protocols: The Internet Network layer, IP Tunneling and Concatenated Virtual Circuits, IP datagram forwarding, encapsulation, fragmentation, and reassembly; Transport Layer Protocol : TCP and UDP , AAL layer in ATM. Internet protocols: IP, ARP, RARP, BOOTAP, Error reporting mechanism (ICMP), OSPF routing, BGP, CDIR, IPv6; TCP and UDP; Addressing schemes;		
Text Book	Computer Networks By A. Tanenbaum		

Course Code	CEN455	Course Name	Digital control
No. of Credit	4	Level	7
Prerequisites	ELE301		
Course Description	Part I: Continuous Systems: Review of mathematical representation of systems, transfer functions, system analysis in frequency and time domains, system stability, compensator design. Part II: Discrete Systems: System Modeling and representation; Difference equations; review of Z transform; Review of sampling and reconstruction; Stability analysis; Design of discrete-time control systems; State-space techniques.		
Text Book	Norman S. Nise ,"Control System Engineering", John Wiley & Sons.		

Course Code	CEN494	Course Name	Project I
No. of Credit	2	Level	7
Prerequisites	The student completed 100 credit CEN342 + CEN433		
Course Description	The student should take a B.Sc. project in related area to his specialization and with technical merit. This project is for two semesters, it is counted as two hour in the first semester. At the end of the semester the student submits a report describing his projects and the parts he completed in the first semester and proposed parts in the 2nd semester.		
Text Book	**N/A**		

Course Code	GEN402	Course Name	Project management Engineering
No. of Credit	3	Level	7
Prerequisites	CSC343		
Course Description	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 organization approaches, leadership elements and decision making, time and cost control, computer applications.		
Text Book	• Project management with CPM, PERT and precedence Diagramming by Moder J , Phillips C, and Davis E. • Management in Engineering, Principles & Practice, Gail Freeman-Rue & James Balkwill, Prentic Hall.		

Course Code	CEN448	Course Name	Networks & Information Security
No. of Credit	3	Level	8
Prerequisites	CEN445		
Course Description	Information security: polices, responsibilities, access control, encryption and privacy, public key encryption, DES, RSA, Network security: packet filtering, proxy and firewall concepts, digital signature; Security protocols in Application layerEmail security; PGP (Pretty Good Privacy) , OpenPGP, Web security and SSL/TLS		
Text Book	• Computer Networks and Internet. Douglas E. Comer. Prentice Hall ,2nd 2000 • D. Gollman . Computer security . John Wily & Sons, 1999		

Course Code	CEN459	Course Name	Intelligent Systems and Robotics
No. of Credit	3	Level	8
Prerequisites	CEN455		
Course Description	Part I Intelligent Systems : AI Definitions, Knowledge representation, Search techniques, Connectionist neural networks, learning and adaptation, self-organization, fuzzy set theory and fuzzy logic, intelligent agents, genetic algorithms, Internet applications. Part II : Robotics : Introductory historical development of robotics, robot arm kinematics, inverse kinematics, dynamics and control, trajectory planning, use of software packages, sensors, image acquisition and processing, autonomous mobile robots, control architectures, LEGO Mindstorms and other robotic kits & devices for experimentation,applications of mobile robots, Internet and Web Robotics,		
Text Book	• S.Russell and Peter Norvig , "Artificial Intelligence -A Modern Approach", Prentice-Hall ,Inc. • K.S.Fu, R.C.Gonzalez, C.S.G.Lee , " Robotics : Control, Sensing, Vision , and Intelligence" McGraw-Hill. • Josef L. Jones and Anita Flynn ,"Mobile Robotics : Inspiration to Implementation",A.K.Peters Ltd.,Wellesley. • Rodney Brooks ," Cambrian Intelligence ", MIT Press.		

Course Code	CEN491	Course Name	Selected Topic in Computer Engineering and networs
No. of Credit	3	Level	8
Prerequisites	none		
Course Description	This course is designed to enable students to study variable special topics of interest, which are carefully selected from EE-related topics. The contents of such a course are to be determined by the instructor and the department.		
Text Book	Journals and Magazines relevant to the topic covered.		

Course Code	CEN495	Course Name	Project (II)
No. of Credit	3	Level	8
Prerequisites	CEN494		
Course Description	In this semester the student continues his work in the project. This may require the student to present his progress monthly. At the end of the semester the student presents a detailed report of developed project and oral presentation. The report should indicate that the student understands the topic and his specific implementation. Any hardware or software should be documented in detail. The students grade is based on his work during the project and commitment to fulfil objectives, on the report, and on his oral presentation.		
Text Book	N/A		

Course Code	ELE417	Course Name	Integrated Circuits
No. of Credit	4	Level	8
Prerequisites	ELE312 + CEN211		
Course Description	The basic steps for the manufacture of integrated circuits: gate silicon technology self-policing, field effect transistor technology Negative channel or doubles CMOS. The rules of design and layout of integrated circuits. Aggregate circuits and circuits with interconnected case, memory circuits and recorders. Introduction to complete identification and semi-specific circuits, introduction to standard cell logic arrays or programmed FPGAs and PLDs, software used in the design and planning of integrated circuits, high-design software level using VHDL language, introduction to design with power and low voltage integrated circuits.		
Text Book	• Gray, Paul R., and Robert G. Meyer. Analysis and design of analog integrated circuits. John Wiley & Sons, Inc., 1990. • Hodges, David A., and Horace G. Jackson. Analysis and design of digital integrated circuits. McGraw-Hill, 1988. • Razavi, el at, " Design of analog CMOS integrated circuits", 2001.		