LADOKE AKINTOLA UNIVERSITY OF TECHNOLOGY, OGBOMOSO

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CURRICULUM

FOR

POSTGRADUATE DIPLOMA PROGRAMMES

(Computer Engineering)

PGD (COMPUTER ENGINEERING) CURRICULUM

Philosophy

This programme in the department is based on the philosophy that the rate of technological development of a nation depends to a great extent on the size, quality, motivation and orientation of its science and engineering workforce. It is clear that the computer is going to play a major role in technological advancement of any nation in the next millennium and will depend largely on the quality and quantity of electronic and computer engineers.

The objectives of the Postgraduate diploma in the department are:

1. To provide students with bachelor's degree ad holder of HND in relevant fields with deeper and specialized knowledge in Electronic and Computer Engineering.
2. Those who wish to make up for their deficiencies in their mothermic background in order to satisfy the requirements for the practice of engineering such as HND courses to become more theoretical, research oriented studies in the University.
3. Those who wish to convert from Computer Science, Physics with Electronics/Applied Mathematics to Computer Engineering field.

The programme is designed such that successful candidates can pass their professional examinations with Nigerian Society of Engineers (NSE) and

Council for the Regulation of Engineering in Nigerian (COREN) and those who have acquired the status of Full Membership of Computer Professional Registration Council of Nigeria (MCPN).

Admission Requirements

i. B. Sc. In Electrical and Electronic Engineering or Computer Engineering with a minimum of Third Class degree.

ii. HND with minimum of lower credit in Electronic/Electrical Engineering or Computer Engineering /Science or Computer Technology.

iii. B.Sc. degree in Mathematics, Physics and Engineering with a minimum or Second Class Lower Degree candidates may be required to undergo a competitive selection test.

Programme Duration

The programme duration is four semesters. The four semesters will be spent for lecturers and tutorial classes, laboratory work and an independent project work will be done during the second semester.

Graduation Requirements

(a) To quality for the award of Postgraduate Diploma a candidate must have been credited with at least 60 units made up of 64 units of compulsory courses which include the project report.

(b) All courses shall be graded out of a minimum of 100 and the past mark shall be 45 marks. Marks shall be assigned appropriate letter grace and its equivalent grade point as follows.

Mark	**Letter Grade**
70 – 100	A
60 – 69	B
50 – 59	C
45 – 49	D
0 – 44	F

Continuous assessment shall be regarded as an integral part of course examination and the marks scored through the continous assessment shall not contain more than 30% of the full marks for the course; with the exception practical work.

All course shall be graded out to a maximum of 100 and the pass mark shall be 45%/. The grading shall be:

Mark	**Grading**
45% and above	Pass
Below 45%	Repeat/Fail

The overall weighted average of Fifty percent (50%) minimum should be obtained for the award of the Postgraduate Diploma.

There shall be a panel of examiners comprising the External, Examiners, Examiners and the Head of the Department, who will chair the panel, to examine candidates on project report, consider the final results and recommend through Faculty Postgraduate Committee to the Postgraduate School, those candidates who have qualified for the award of the diploma.

COURSE OUTLINE

First Semester

CSE 601: Computer Programme I	-	3
CSE 615: Engineering Mathematics I	-	3
CSE 603: Computer Logic	-	3
CSE 610: Network Analysis	-	3
CSE 621: Engineers in Society	-	2
CSE 623: Engineering Statistics	-	2
Total		**16**

Second Semester

CSE 602: Computer Programming II	-	3
CSE 616: Computer Engineering	-	3
CSE 618: Introduction to Microprocessor & Microcomputer Technology	-	3
CSE 620: Computer Engineering Lab	-	1
CSE 622: Low Level Language	-	3
CSE 624: Engineering Mathematics II	-	3
Total		**16**

Third Semester

CSE 625: Technical Reports Writing	-	2
CSE 611: Computer Architecture	-	3
CSE 627: Operating Systems	-	3
CSE 629: Control Engineering	-	3
CSE 631: Data Communications	-	3
CSE 633: Project I	-	3
Total		**17**

Fourth Semester

CSE 626: Hardware Design Studies	-	3
CSE 628 Computer Networks	-	3
CSE 630: Hardware Design Lab	-	2
CSE 632: Project II	-	3
CSE 634: Engineering Law, Management & Entrepreneurship	-	2
CSE 636: Engineering Materials	-	2
Total		**17**

Electives

CSE 637: Microwave Engineering	-	3
CSE 638: Principles of Compilers	-	3
CSE 639: Computer Graphics	-	3
CSE 640: Modeling and Simulation	-	3
CSE 641: Electromagnetic Principles	-	3
CSE 642: Communication Principles	-	3
CSE 643: Numerical Computation	-	3

COURSE CONTENTS

CSE 601/602: Computer Programming I/II (3 Units)

Structured programming principles. Keywords and standard identifiers, structure of a programming language. I/O statements. Control structures. Arrays, sub-programming, records files, sets, enumerated and sub-range data. Use Pascal.

CSE 603: Computer Logic (1 – 2 Units)

Review of Boolean algebra and logic circuit representation – Boolean algebra, truth table, Venn diagram and Karnauph-mapping. Counters; classification, synchronous and asynchronous counters. Programmable counters, reversible, decade and Modulo-M counters. Registers: types- shift registers, feedback shift registers etc and application. Programmable and

Memory devices. Integrated circuit's characteristics of Digital logic families MSI, LSI, DRI, RTL, DTLK, TTL, etc. Digital converters. Introduction to microprocessors.

Programs and their linkage. Linkers and loaders. Relocating loaders. Interfacing assembly language programs with high level language programs.

CSE 611: Computer Architecture

Hardware features of modern computer systems structural and functional characteristics of computer components. Organization and design of digital computing systems; description of current typical computing structure CPU configuration and possible architecture software/hardware trade offs.

CSE 615: Engineering Mathematics I

Principles of Differential Calculus, Applications to plane curves, tangent, normal and curvature. Sequence and series Taylor's and Maclaurin's series; to include functions of several variables Maxima, Minimal and Saddle point. Approximate solution of equation. Principles of integral calculus. Numerical integration. First and Second order differential equations. Multiple integration, line, surface and volume integral. Partial Differential equation and applications to engineering problems.

CSE 616: Computer Engineering (3 Units)

(a) **Circuits**

General requirements, circuit parameters – Fan in/ out, Noise immunity and generation, circuit topology, speed/power.

Basic circuit – Gates, flip-flops, registers.

Counters, Circuit families – TTL, ECL, MOS, DRL.

Special circuit- Pulse shaping, Driving, Addrs.

Tuning – Delays, Strobing.

Interconnection, Back winding, interfacing.

Peripheral equipment circuitry.

(b) **Reliability**

Component selection-sampled testing. Mean Time Between Failure: Redundancy-component and system levels repetitive operation. Error detection and correction-Parity, Grey codes Processing Errors, Fail safe/soft.

CSE 618: Introduction to Microprocessor and Microcomputer (3 Units)

The intel 4004, 4040, 8080, 8085, 8086, 80286, Pentium. Other microprocessor. Common, microprocessor manufactures. Classification and types of microprocessors. Microprocessors systems. Examples of microprocessor system. Overview of 16 and 32 bit microprocessor (INTEL, MOTOROLA). Architecture and operation of a standard microprocessor.

But diagram of a microprocessor system: mechanical layer, electrical characteristics. Mechanical ME trans. Interconnection. ME trans, interconnection. Microprocessor systems. Memories in microcomputer systems. Address decoding strategies and decoders. Microcomputer interface: programmable peripheral interface, peripheral interface adapter, DMA, Serial I/O interface. Timing and interrupt. CISC Vs RISC. Multiprocessor systems. Bit –slice microcomputers. Structured Programming Testability, Recoverability Pesudecodes Instruction set. High –level programs for microprocessors.

CSE 619: Network Analysis (3 Units)

Review of Network theorems; Thevenin's and Norton's Reciprocity, star-delta transformation and maximum power transfer. Two port networks y-parameters, z-parameters, h-parameters and transmission parameters. Responses of networks: Transient and steady state analysis. Networks Laplace transforms and applications. Fourier analysis; Real and Complex form of Fourier series. Fourier analysis of complex waveform. Line spectra representation of periodic signal. Fourier transform and convolution concepts.

CSE 621: Engineers in Society (1 Units)

Growth and effects of technology on the society. A review of the Nigerian situation Role and responsibilities of an Engineer in Society, social, moral and legal responsibilities. Education and training of Engineers. Industry, Commerce and Management functions. Production, Personnel etc. industrial law and labour relations. Manpower development and training. Private and state control of enterprises. Introduction to operation research and applications in Management techniques. Introduction to business/ industrial law.

CSE 622: Level Language (3 Units)

Introduction to machine and assembly language. Machine programming model i.e registers sets and memory structure. Concepts and instruction formats. Data word definition. Address techniques including absolute, relative, indexed and indirect modes. Implementation of high level language operations and constructs in assembly language. Stack operations. Procedures and parameters passing. I/O instruction and device handing. Operation System interface Multi-module.

CSE 624: Engineering Mathematics II

Introduction to Fourier series analysis. Fourier transforms. Laplace transforms and simple application to engineering. Integral functions: Gamma, Beta, Error and Elliptic function.

Vector, scalars, vectors and scalar fields. Production of two, three or more vectors. Vectors differentiation coordinates geometry of lines and planes.

Introduction to complex numbers. Elementary functions of complex variable. Determinats and their properties. Solution of set of linear equations, Crammer's rule Matrices; Multiplexing/Demultiplexing; MODERN, ADC, Systems Viability, Graceful degradation; MITTR, MTBF, etc Computer selection for a given application economic versus technical consideration.

CSE 627: Operating System (3 Units)

Hardware and software organization of computer systems Batch operating concepts. Device drivers, scheduling, priority memory management, interrupt handling, inter-processor communication principles of multiprocessing and time sharing systems. Interpreters, assembler system and application to Unix and C.

CSE 628: Introduction to Computer Network (3 Units)

Introduction to computer network. Network topologies, ISO model for computer network protocols. Types of network-LAN MAN and WAN, ISO-OSI Reference models. Interfacing and internetworking. Local Area Network and Wide Area. Network. Network operating systems.

CSE 629: Control Engineering (3 Units)

Classification and examples of control systems. Control systems technology, open logo and close loop block diagram models. Mathematical models of feedback systems. Type of response, second other system, open loop and close transfer functions. Characteristics of system stability root locus. Ruth test and Nyquist criterior, Huwitz stability criterion. Fractional stability criterion. Procedure blocks in cascade canonical form of feedback system. Multi-input system. Reduction techniques signal flow graphs, construction techniques, input output game formula. Reduction by signal flow graphs. Routh locus analysis and design.

Nyquist analysis and design. Bode analysis. Construct M circles, construct N circles, Nichols chart. Compensation techniques, lead, lag, lead-lag and lag-lead compensation. Concept of state variables, state variable representation of SISO & MIMO systems, state transition matrix and solution of linear time

invariant systems, canonical forms. Controllability, observability and stability.

CSE 630: Hardware Design Laboratory (2 Units)

This course is meant to provide students the opportunity to make their own hardware designs as teams and individuals and attempts to construct such design under the guidance of the course instructor.

CSE 631: Data Communication (2 Units)

Information element in binary system. Conversion of continuous wave signals to binary data. Bit and Binary convention. The do nature of data transmission. Neutral and Polar modes of transmission. Bits and Baud. Sources, entropy and the noiseless coding theorem. Asycnchronous Transmission frame structure error and detection, throughout and overheads. Synchronous.

Transmission: Protocol frame structure, error correction and detection clock timing. Cyclic redundancy check (c), throughout and overheads, flow control, nature of Errors. Forward-error-correction (FEC). Error correction with feedback channel, Hamming code. Hamming distance. Cyclic codes. Automatic repeat request (ARQ). Bit –error-rate (BER). Distortion Analog media support for binary data. Digital transmission media. Circuit-switched and Virtual-switched data transmission channels. Channels bandwidth

consideration capacity, noise and distortion, Memory-less channel. Simplex half-duplex transmission modes. Equalizer conditioning for leased line operation.

CSE 633/634 Project I/II (3 Units)

These courses afford the students the opportunity to try their hands on problems in one of the professional areas of emphasis viz computer system Design, knowledge-base Systems, Hardware system design, Computer Engineering, Artificial Intelligence. The projects should embrace the convergence of Electronics Computer communications and Control Engineering.

CSE 637: Microwave Engineering (2 Units)

Review of Maxwell equations. Transmission line and wave guides (rectangular and circular). Impedance matching and transformation. Passive microwave devices. Resonant cavities and methods of excitation. Microwave antennas and Radar systems. Planar structures; parallel plate transmission lines, micro strip lines and circuits. Solid state device microwave bipolar and FET, model and s-parameters. Vaccum devices; magnetron, traveling wave tube, Klystron, etc.

CSE 638: Principles of Compliers (3 Units [3 – 0 – 0])

a. Definition; Basic concepts of computer.

b. Application of regular expression in lexical scanners, Parsing (concrete and abstract syntax, abstract syntax trees).

c. Application of context-free grammars in table-driven and recursive-descent parsing.

d. Symbol table management, code generation by tree walking.

e. Compilation approaches- Multimpass, Single Pass, Load and Go; Complier implementation-scanning syntax directed table driven.

f. Optimization techniques.

g. The use of tools in support of the translation process and the advantages thereof program libraries and separate compilation. Building syntax-directed tools.

CSE 639: Computer Graphics (2 Units [2 – 0 – 0])

a. Hierarchy of graphics software.

b. Using a graphics API.

c. Simple colour models (RGB, HSB, CMYK).

d. Homogenous coordinates.

e. Affined transformations (scaling, rotation, translation).

f. Viewing transformation, Clipping.

g. Programming examples in the creation and manipulation of graphics objects.

h. Animation (2D and 3D).

CSE 640: Modeling and Simulation (2 Units [2-0-0])

a. Simulation Programming environments. Requirement analysis and design modeling tools Testing tools.

b. Configuration management tools Tool integration mechanisms.

c. Basic concepts in computer simulation, methodology, experimental design, simulation language.

CSE 641: Electromagnetic Principles (2 Units)

Review of electronics and magnetic fields. Time varying electromagnetic field in different media. Introduction to Poisson's and Laplace's equations. Boolean valued problems. Maxwell equations and its applications. Pointing theorem wave equations, Plane wave and propagation. Electromagnetic waves. Review of transmission theory, common wave-guide and propagation in regular wave-guide and propagation in regular wave-guides, attenuation in guides, guide termination and reasonant cavities.

CSE 643: Numerical Computation

(a) Computation – Representation of number, errors Computation of function.

(b) Solution of Non-linear Equations.

(c) Newton-Raphson Method, iterative methods. Bairston's method. Aitken's techniques.

(d) System of Linear Equations – Gaussian elimination, triangularization method.

(e) Algebraic Eigen value Problems.

(f) The characteristics polynomial, the Power method, Gwens and Householder methods.