4th YEAR ODD SEMESTER

CSE 4000 Contact Hours/week: 2
Project / Thesis I C r e d i t s: 1.00
Prerequisite: None
Study of Problems in the Field of Computer Science and Engineering.
N.B. The Project/Thesis Topic Selected in this Course is to be continued in the CSE 4000
Course.
CSE 4101 Contact Hours/week: 3
Complier Design C r e d i t s: 3.00
Prerequisite: CSE 2205

Introduction to Compiler: Compiler Structure, Analysis-Synthesis Model of Compilation,
Various Phases of a Compiler, Tool based Approach to Compiler Construction, Complier-
Compliers and Translator Writing Systems.
Lexical Analysis: Interface with Input, Parser and Symbol Table, Token, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting, Implementation, Regular Definition, Transition Diagrams, Lex.
Syntax Analysis: CFGs, Ambiguity, Associativity, Precedence, Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing, Bottom
Up Parsing, Operator Precedence Grammars, LR Parsers (SLR, LALR, LR), YACC.
Syntax Directed Definitions: Inherited and Synthesized Attributes, Dependency Graph,
Evaluation Order, Bottom Up and Top Down Evaluation of Attributes, L- and S-Attributed
Definitions.
Type Checking: Type System, Type Expressions, Structural and Name Equivalence of Types, Type Conversion, Overloaded Functions and Operators, Polymorphic Functions.
Run Time System: Storage Organization, Activation Tree, Activation Record, Parameter
Passing, Symbol Table, Dynamic Storage Allocation, and Heap Storage Management.
Intermediate Code Generation: Intermediate Representations, Translation of Declarations, Assignments, Control Flow, Boolean Expressions and Procedure Calls, Implementation Issues.
Code Generation and Instruction Selection: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, Dag Representation of Programs, Code Generation
from Dags, Peep Hole Optimization, Code Generator Generators, Specifications of Machine.
CSE 4102 Contact Hours/week: 3/2
Sessional based on CSE 4101 Credits: 0.75
Prerequisite: None
Sessional based on the theory of course CSE 4101.
CSE 4103 Contact hours/week: 3

Digital Signal Processing Credits: 3.00
Prerequisite: None
Introduction: Signals, Systems and Signal Processing, Classification of Signals, the Concept of Frequency in Continuous Time and Discrete Time Signals, Analog to Digital and Digital to Analog Conversion, Sampling and Quantization.
Discrete Time Signals and Systems: Discrete Time Signals, Discrete Time Systems, Analysis of Discrete Time Linear Time Invariant Systems. Discrete Time Systems Described by Difference Equations, Implementation of Discrete Time Systems, Correlation
and Convolution of Discrete Time Signals.
The Z-Transform: Introduction, Definition of the Z-Transform, Z-Transform and ROC of Infinite Duration Sequence, Properties of Z-Transform Inversion of the Z-Transform, the One-Sided Z-Transform.
Frequency Analysis of Signals and Systems: Frequency Analysis of Continuous Time
Signals, Frequency Analysis of Discrete Time Signals, Properties of Fourier Transform of
Discrete Time Signals, Frequency Domain Characteristics of Linear Time Invariant System, Linear Time Invariant Systems as Frequency Selective Filters, Inverse Systems
and De-convolution.
Discrete Fourier Transform (DFT): Discrete Fourier Series (DFS), Properties of DFS, Discrete Fourier Transformation (DFT), Properties and Application of DFT.
Fast Fourier Transform Algorithms: FFT Algorithms, Applications of FFT Algorithm.
Digital Filter Design Techniques: Differential and Difference Equations, Digital Transfer
Functions, Frequency Response, Digital Filter Realization Scheme, Finite Impulse Response (FIR) Infinite Impulse Response (IIR) Filter Design.
Application of DSP: Speech Processing, Analysis and Coding, Matlab Application to DSP.
CSE 4104 Contact hours/week: 3/2
Sessional based on CSE 4103 Credits: 0.75
Prerequisite: None
Sessional based on the theory of course CSE 4103.
CSE 4105 Contact hours/week: 3
Digital Image Processing Credits: 3.00
Prerequisite: None
Digital Image Fundamentals: Different Types of Digital Images, Sampling and Quantization, Imaging Geometry, Image Acquisition Systems.
Bi-level Image Processing: Basic Concepts of Digital Distances, Distance Transform, Medial Axis Transform, Component Labeling, Thinning, Morphological Processing, Extension to Grey Scale Morphology.

Binarization of Grey Level Images: Histogram of Grey Level Images, Optimal Thresholding using Bayesian Classification, Multilevel Thresholding.
Detection of Edges : First Order and Second Order Edge Operators, Multi-Scale Edge Detection, Canny's Edge Detection Algorithm, Hough Transform for Detecting Lines and

Curves, Edge Linking.
Images Enhancement: Point Processing, Spatial Filtering, Frequency Domain Filtering, Multi-Spectral Image Enhancement, Image Restoration.
Image Segmentation: Segmentation of Grey Level Images, Water Shade Algorithm for Segmenting Grey Level Image. Image Representation and Description, Recognition and Interpretation.
Image Compression: Lossy and Lossless Compression Schemes, Prediction based Compression Schemes, Vector Quantization, Sub-Band Encoding Schemes, JPEG Compression Standard, Fractal Compression Scheme, Wavelet Compression Scheme.
CSE 4106 Contact Hours/week: 3/2
Sessional based on CSE 4105 Credits: 0.75
Prerequisite: None
Sessional based on the theory of course CSE 4105.
Optional I
CSE 4107 Contact hours/week: 3
Information System Analysis and Design Credits: 3.00
Prerequisite: CSE 3105
Application Development Policy and Strategies: Planning of Information System, Policy in Information System Development, Strategies for Achieving Information System Goals.
Application System Development Life Cycle: Phases in Application System Development, Interrelationship among Each Phase.
Feasibility Assessment: Problems and Needs in Information System Development, Preliminary Application Requirements Determination, Feasibility Assessment: Economic,
Technical, Operational and Schedule Feasibility.
Information Requirements Determination: Strategies for Obtaining Information Requirements, Technique for Information Requirements Determination, Methods for Providing Assurance that Requirement are Correct and Complete.
Structured Systems Analysis: Steps in Structured Systems Analysis, Activity Diagrams
and Related Documentation, Data Dictionary, Problem Analysis, Structured Walk Through.
Systems Design Methodology: Check List Methodology, Process-Oriented Methodology, Application Generator, Structured Design, Program Development and Testing: Structured Programming and Method for Testing.
CSE 4108 Contact Hours/week: 3/2
Sessional based on CSE 4107 Credits: 0.75
Prerequisite: None
Sessional based on the theory of course CSE 4107.
CSE 4109 Contact hours/week: 3
Unix Programming Credits: 3.00
Prerequisite: None
Introduction: Introduction to Unix Programming.
Unix Environment: Command Line, Globbing, I/O Redirection, Piping, Basic Commands,

Memory Layout.
Debugging: GDB, Valgrind, Essential X86, Fork, Exec, Wait, Process Status, Bit Manipulation, Sending Signals Unix I/O Implementing I/O Redirection, Piping Directories and Files. Walking a Directory Tree, Exploring Attributes. Implementing Ls-L. Permissions,
File Owner / Group, Time-Stamps. Signals and Signal Handling Design / Implementation
of Sleep Process Relationships Backgrounding. Popen / Pclose Midterm Terminal Handling Review Midterm Networking Client / Server. I/O Multiplexing.
Multi-threading: Basics, Mutual Exclusion Multi-Threading: Bounded Buffers, Condition Variables Multi-Threading: Deadlocks Non-Blocking I/O. Regular Expressions. Sys V IPC.
Semaphores and Shared Memory. Shell Scripting.
CSE 4110 Contact hours/week: 3/2
Sessional based on CSE 4109 Credits: 0.75
Prerequisite: None
Sessional based on the theory of course CSE 4109.
CSE 4111 Contact hours/week: 3
Digital System Design C r e d i t s: 3.00
Prerequisite: CSE 2203

System Design: Designing I/O System; I/O Devices; Designing Microprocessor based System with Interfacing Chips.
Programmable Design: Programmable Peripheral Interface (Interface to A/D and D/A Converter); Keyboard/Display Interface; Programmable Timer; Programmable Interrupt Controller, DMA Controller.
Memory Design: Design using MSI and LSI Components; Design of Memory Subsystem
using SRAM and DRAM.
Design of Various Components of a Computer: ALU, Memory and Control Unit, Hardwired and Micro Programmed; Microprocessor based Designs; Computer BUS Standards; Design Special Purpose Controllers.
CSE 4112 Contact hours/week: 3/2
Sessional based on CSE 4101 Credits: 0.75
Prerequisite: None
Sessional based on the theory of course CSE 4111.
CSE 4113 Contact hours/week: 3
Simulation and Modeling Credits: 3.00
Prerequisite: None
Simulation Modeling Basics: Systems, Models and Simulation; Classification of Simulation Models; Steps in a Simulation Study.
Concepts in Discrete-Event Simulation: Event-Scheduling vs. Process-Interaction Approaches, Time-Advance Mechanism, Organization of a Discrete-Event Simulation Model; Continuous Simulation Models; Combined Discreet-continuous models; Monte Carlo Simulation; Simulation of Queuing Systems.
Building Valid and Credible Simulation Models: Validation Principles and Techniques,

Statistical Procedures for Comparing Real-World Observations and Simulated Outputs, Input Modeling; Generating Random Numbers and Random Variates; Output Analysis. Simulation Languages; Analysis and Modeling of Some Practical Systems.

CSE 4114 Contact hours/week: 3/2

Sessional based on CSE 4113 Credits: 0.75

Prerequisite: None

Sessional based on the theory of course CSE 4113.

CSE 4115 Contact hours/week: 3

Wireless Networks Credits: 3.00

Prerequisite: CSE 3205

Introduction to Wireless Networks: Wireless Access Networks, Wireless Mesh Networks, Personal Area Networks (Wireless Sensor Networks, Body Area Networks, Lowpan, and Bluetooth), Wireless and Mobile Ad Hoc Networks, Challenged Networks (Dtns,Vanets).

Wireless MAC Protocols: IEEE 802.11, IEEE 802.11e, IEEE 802.11n, IEEE 802.11s, IEEE 802.15.4, S-MAC, B-MAC, IEEE 802.22/20, IEEE 802.16d/e.

Wireless Routing: Routing Matrix – ETX, ETT, WCETT, Air Time Metric, Routing Protocols – AODV, DSR, DSDV, HWMP, Sensor Network Routing, VANET Routing etc.

Others: Wireless Transport Protocols; Wireless TCP and its Variants, Hop by Hop Congestion Control, Rate based Congestion Control etc. Quality of Service in Wireless Networks.

CSE 4116 Contact hours/week: 3/2

Sessional based on CSE 4116 Credits: 0.75

Prerequisite: None

Sessional based on the theory of course CSE 4115.

Optional II

CSE 4117 Contact Hours/week: 3

Parallel and Distributed Processing Credits:3.00

Prerequisite: None

Multithreaded Computing: Basic Concepts: Processes, Threads, Scheduling, Multithreaded Programming, Thread Synchronization: Semaphores, Locks, Monitors, Concurrency Issues: Deadlock, Starvation , Multi-Core Computers.

Networked Computers: Basic Concepts: Client-Server, Connections, Datagrams, Application Protocol Design, Client-Side Socket Programming, Server-Side Socket Programming, Datagram Programming.

Network Protocols and Security: Physical/Data Link/Network/Transport/Application Layers, Network Security.

Distributed Systems: Architectures: Two-Tier, Multi-Tier, Peer-To-Peer, Many-To-Many,
Middleware: Distributed Objects, Web Services.

Parallel Computing: Architectures: SMP, Cluster, Hybrid, Grid, GPGPU ,Middleware: Openmp, MPI, Grid Middleware.

CSE 4119 Contact Hours/week: 3

Human Computer Interaction C r e dits:3.00

Prerequisite: None

Process and Model: Introduction to Human-Computer Interaction (HCI), Human

Information Processing Systems, Models of Interaction, Approaches to HCI, User Interface, HCI in Software Process, Cognitive Models.
Issues and Requirements: Socio-organizational Issues and Stakeholders Requirements,
Communication and Collaboration Models, Task Analysis, Dialog Notation and Design, Groupware, CSCW and Social Issues.
User System Interaction: Analysis and Design, User Interface Design, Interface Technique and Technology, Case Studies.
CSE 4121 Contact Hours/week: 3
Switching Systems Credits:3.00
Prerequisite: None
Evolution of Switching Systems: The Role of Switching Systems in Telecommunication
Networks, Step by Step and Crossbar, Stored Program Control (SPC), Digital Switching,
ATM Switching.
Switching System Architecture: Subscriber and Line Interface, Switching Network: Matrix and Channel Graph Representations, Blocking, Non-Blocking, and Rearrangeable
Networks, Control Unit, Operation and Maintenance, Switching Process: Call Detecting, Number Analysis, Call Routing, Supervision, and Metering, Signaling Equipment.
Hardware and Software Structure of the Digital Switch: Time Switches and Space Switches, Path Searching, Processor Systems Architecture and Functions, Reliability and
Fault Recovery, Man Machine Interface (MMI), Examples of the Present Digital Switching
Systems.
ATM Switching Architectures and Performance: ATM Switch Architectures, Full-, and
Partial-Connection Multistage Networks, Self-Routing Networks, ATM Switching.
Structures: Minimum-Depth Blocking Networks, Non-Blocking Single-, and Multiple-Queuing Networks, Arbitrary-Depth Blocking Networks, Fault-Tolerant ATM Switching Architectures.
New Trends in Switching: Photonic Switching, IP Switching.
CSE 4123 Contact Hours/week: 3
Control System Engineering C r e dits:3.00
Prerequisite: None
Introduction to Control System: Conventional Control System, Steady State Response
to Step, Ramp, and Parabolic Inputs, Transient Response, Poles and Zeros, Frequency Response from Pole-Zero Diagram, Routh's Stability Criterion; Block Diagrams, Canonical Forms, Transfer Functions and Signal Flow Graph, Root Locus, Frequency Response, Nyquist's Stability Criterion.
Modern Control System: Introduction, State Variable Analysis, Controllability and Observability, Application of Eigen Value, Linear Control System Design by State Feedback.

Controller Design: On-Off, Fuzzy, P, PI, PD and PID Types, Introduction to Programmable Logic Controllers (PLC), Temperature Control System, Position Control System.