NATIONAL UNIVERSITY

Third Year Sixth Semester Syllabus

Department of Computer Science and Engineering

Four Year B.Sc. Honours Course

National University

Subject: Computer Science and Engineering
Syllabus for Four Year B.Sc. Honours Course
Year wise courses and marks distribution

THIRD YEAR SIXTH SEMESTER

Course Code	Course Title	Credit Hours
530219	Software Engineering	3.0
530220	Software Engineering Lab	1.5
530221	Computer Networking	3.0
530222	Computer Networking Lab	1.5
530223	Embedded System Programming	3.0
530224	Embedded System Programming Lab	1.5
530225	Theory of Computation	3.0
	Total Credits in 6th Semester	**16.5**

Course Code : 530219	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Software Engineering		

Software Engineering Paradigms: Definition of S/W Eng.; The classical life cycle; Prototyping fourth generation technique; The product and the process model, Generic view of software engineering, Boehm's spiral model, Measurement and Matrices.

Requirements Analysis Fundamentals: Analysis principle; Feasibility Study, Software Prototyping Specification; Requirement Analysis Methodologies; Structured and object oriented analysis; Data Flow-oriented analysis methods.

Software Design Fundamentals: Design process; Design fundamentals: S/W architecture, Program structure, Data structure, S/W procedure, Modularity, abstraction; Effective modular design; Procedural design; Data flow-oriented Design; Top-down and bottom-up design; Design process considerations; Transform analysis; Transaction analysis; Data structure-oriented design: Logical construction of programs and systems, Data structured systems development; Objectoriented design; Design concepts; Methods; strategy. Real-time Design; Coding style: Code documentation, Data declaration, statement construction, Input/output, Software reliability.

Software Testing Techniques and Strategies: Software Testing method, Testing fundamentals & strategies; White box testing; Basis path testing; Loop testing; Black Box testing. Verification and validation; Organization for software testing; Defect testing; Integration testing; Validation testing; System testing; The art of debugging.

Software Management and Maintenance Technique: Maintenance process, System documentation, Maintenance cost, Configuration management & planning, Change management, person & release management, Software cost estimation technique, Algorithmic cost modeling, The COCOMO model, Software quality assurance & activities, McCall's quality factor, Software reuse, Software re-engineering, Computer Aided Software Engineering (CASE) tool.

Reference Books:

1) Ian Sommerville, *Software Engineering*.
2) Roger S. Pressman, *Software Engineering: A Practitioner's Approach*. 3)

   Martin L. Shooman, *Software Engineering*

Course Code : 530220	Marks : 40	Credits :1.5	Class Hours : --

Course Title :	Software Engineering Lab

(Based on Software Engineering Theory Course CSE 530208)

Course Code : 530221	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Computer Networking		

Introduction: Basic computer network concept; Network structure; Network software; Reference model; Example networks; OSI Model, TCP/IP Model, X.25 Networks.

Frame Relay: Introduction to frame relay, advantages and disadvantages, role of frame relay, frame relay operations, virtual circuits, DLCIs inside the network, ,frame relay layers; physical layer , data link layer.

ATM Network: Packet networks, mixed network traffic, cell networks, asynchronous TDM,virtual connection, identifiers, cell, connection establishment and release, Application Adoptions Layer(AAL),ATM layers, Physical layer, ATM WANs, ATM LANs.

Medium Access sub-layer: Multiple Access Protocols: ALOHA; CSMA/CD Protocol; Collision-Free protocols;CDMA Limited contention protocol; Wavelength division multiple access protocols; Wireless LAN protocols; IEEE standard 802 for LANs and MANs; Bridges; High-speed LANs;Wireless LANs,Mobile telephony and Satellite Networks.

Network Layer: Network layer design issues; Routing algorithms; Congestion control Algorithms; Inter networking; Network layer in the internet; IPv4 and introduction to IPv6. **Transport Layer:** The transport service; Elements of transport protocols; The internet transport protocols; The ATM AAL layer protocols;

Optical Fiber Network: SONET and SDH.
Application Layer: Network security; DNS-Domain Name system; SNMP: Simple Network Management protocol; Electronic Mail; The World Wide Web; Multimedia.

Reference Books:

1. Tannenbaum ,Computer Networks.
2. W. Stallings, Data & Computer Communication.
3. Behrouz & Forouzen, Data Communication & Networking.

Course Code : 530222	Marks : 40	Credits : 1.5	Class Hours : --
Course Title :	Computer Networking Lab		

Laboratory classes are based on course CSE 530210. Starting with application layer, students will configure different services at different layers and examine their messaging techniques. Students will also develop some experiments to work transport layer services such as TCP and UDP.

Course Code : 530223	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Embedded System Programming		

Concept of visual programming; system programming concepts; general machine structures; Internet programming; environments; multiple document interfaces; ActiveX controls and ActiveX components; API; apache server; OLE automation; database programming and Active data objects; introduction to the web; scripting objects; active server pages; database connectivity to web applications; adding dynamic content to web applications; programming common gateway interfaces; programming the user interface for the web applications; programming with concurrency and multithreading; service-oriented software development; XML and related technologies: XML schema XSLT, XPath, DOM, SAX; web-based application development and state management; Kernel programming; programming for memory management; VFS handling; interrupt handling; Linux module programming; assembler: basic functions, machine dependent and independent assembler, one vs. multipass assembler; linker: dynamic lining and linking editors, loaders: machine dependent and independent loader, bootstrap loaders, development of system software and web-based applications for different devices.

Reference Languages: Android, J2ME, C++.

Reference Books:

1. William Green and John D. Olson, *PowerBuilder 9: Internet and Distributed Application Development*, Published by Sams Publishing.
2. Randall A. Maddox, *Distributed Application Programming in C++*, Published by Prentice Hall.
3. Luke Welling and Laura Thomson, *PHP and MySQL Web Development*, Published by Addison-Wesley Professional, 4th Edition.
4. Robin Nixon, *Learning PHP, MySQL, JavaScript an CSS: A Step-by-Step Guide to Creating Dynamic Websites*, Published by O'Reilly Media, 2nd Edition.

Course Code : 530224	Marks : 40	Credits : 1.5	Class Hours : --
Course Title :	Embedded System Programming Lab		

Laboratory classes are based on course CSE 530212. Students will get knowledge for developing some system tools based on various system calls. Linux module programming will be an important part of this lab. They will be asked to develop device drivers and applications programs for different devices.

Course Code : 530225	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Theory of Computation		

Language theory; finite automata: deterministic finite automata, nondeterministic finite automata, equivalence and conversion of deterministic and nondeterministic finite automata, pushdown automata; regular expressions and its properties: Chomsky hierarchy, regular grammar and regular language; context free languages; context free grammars; Pumping lemma and its applications; Turing machines: basic machines, configuration, computing with Turing machines, combining Turing machines; Mealy machine and Moore machine; undecidability: diagonalization method, halting problem, undecidable problems from language theory and reducibility; recursive theorem;

Reference Books:

1) Michael Sipser, *Introduction to Theory of Computation*, Published by Thomson, 2nd Edition.
2) John C. Martin, *Introduction to Languages and Theory of Computation*, Published by McGraw-Hill, 3rd Edition.