COURSE STRUCTURE OF B. TECH IN COMPUTER SCIENCE & ENGINEERING, HIT

Detailed Syllabus of 6th Semester:

Course Name : COMPUTER NETWORKS					
Course Code: CSEN3201					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	1	0	4	4

Module I: Data Communication Fundamentals and Physical Layer [10L]
(A) **Introduction:** Direction of data flow (simplex, half duplex, full duplex), Network topology, categories of network (LAN, MAN,WAN); [1L]
(B) **Protocols and standards:** Reference models: OSI reference model, TCP/IP reference model, their comparative study [2L]
(C) **Physical Layer:** Digital signal coding, Modulation(Digital and Analog), Multiplexing [1L]
(D) Switching, Telephone Networks [4L]
(E) Transmission Media and its properties; [2L]

Module II: Data Link Layer and MAC Sublayer   [13L]
(A) Data link layer Framing / Stuffing, Error detection and correction; [4L]
(B) Flow Control Protocols: Stop-and-Wait / Go-Back-N / Selective Repeat; [3L]
(C) HDLC, PPP [1L]
(D) MAC sub-layer: Ethernet (IEEE 802.3) : ALOHA / CSMA-CD / Collision Resolution, Controlled Access and Channelization methods; [3L]
(E) Devices: Transparent Bridges / Source-Route Bridges / Ethernet Switches ; Backward Learning Algo; Construction of Spanning Trees;   Routers. [2L]

Module III: Network layer and Internetworking: [10L]
(A) IPv4: Packet format ; Classful addressing / subnetting / subnet mask; CIDR / supernetting / masks; [3L]
(B) IPv6: address format / packet format / differences with IP (v4);   [1L]
(C) Protocols: IP, ICMP, ARP [2L]
(D) Routing algorithm: concept of static and dynamic routing, Distance vector / Link state algo; [2.5L]
(E) Protocols: OSPF, BGP   [1.5L]

Module IV: Transport and Application layer [10L]
(A) Transport Layer: Process to process delivery / multiplexing and other services of transport layer [1L]
(B) Transport Layer protocols: TCP: Three way handshaking, Window management, Flow and congestion control with slow start, additive increase, multiplicative decrease; UDP; Difference between UDP and TCP [4L]
(C) General Congestion control algorithm: open and closed loop; Techniques to improve: QoS Leaky bucket / Token bucket. [2L]
(D) Modern Topics: Introduction to wireless LAN and Bluetooth, Mobile IP, Mobile TCP [3L]

Text Books:
1. Andrew S. Tanenbaum: Computer Networks, Pearson Education , fourth edition.
2. William Stallings: Data and Computer Communication, Prentice hall, Seventh edition.
3. William Stallings: High speed Networks and Internets, Pearson education, second edition.

References:
1. William Stallings: Cryptography and Network security PHI, Third edition.
2. William Stallings: ISDN and Broadband ISDN with Frame Relay and ATM.
3. Kurose & Ross: Computer Networking: A Top Down Approach, 5th Ed.

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Course Outcomes/Learning Outcomes:

Upon completion of their academic and internship requirements, graduates of Champlain College's undergraduate Computer Networking Program will:

- Describe and analyze the hardware, software, components of a network and the interrelations.
- Explain networking protocols and their hierarchical relationship hardware and software. Compare protocol models and select appropriate protocols for a particular design.
- Explain concepts and theories of networking and apply them to various situations, classifying networks, analyzing performance and implementing new technologies.
- Identify infrastructure components and the roles they serve, and design infrastructure including devices, topologies, protocols and security. Analyze performance of enterprise network systems.
- Use appropriate resources to stay abreast of the latest industry tools and techniques analyzing the impact on existing systems and applying to future situations.

Course Name : Software Engineering					
Course Code: CSEN3202					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	1	0	4	3

Module-1[10L]:
1. Introduction to Software Engineering (3L)
- Software Engineering – objectives and definitions
- Software Life Cycle – different phases
- Lifecycle Models - Waterfall, Relaxed Waterfall, RAD, Prototyping, Incremental, Spiral, Agile
2. Requirements Phase (3L)
- Requirements Collection and Analysis
- Requirement Specifications – General Structure of Software Requirement Specifications (SRS)
- Functional and Non-functional Requirements
- Representing Requirements as Use Cases with examples
3. Structured Analysis Modeling Techniques (4L)
- Process Model using Context Diagrams (CD) and Data Flow Diagram (DFD) with examples
- Data Dictionary, Decision Tree, Decision Table with examples
- Data Model using Entity Relationship Diagram (ERD) with examples

Module-2: **[10L]**
4. Design Phase (4L)
- Overview – Comparison between Requirement Analysis and Design, Attributes of Good Design
- Define Approaches – Functional and Object Oriented
- Design Aspects – Top-Down and Bottom-Up
- Structured Design – Module Design (or High Level Design), Detail Design (or Low Level Design)
- Functional Decomposition – Abstraction, Cohesion, Coupling, Structure Chart, Structured English
5. Object Oriented Analysis and Design (6L)
- OOAD Basic Concepts
- Unified Modeling Language (UML) – different types of diagrams for different views of system
- User View – Use Case Diagram with examples
- Structural Views – Class Diagram with examples
- Behavioral View – Sequence, Collaboration, Activity and State Chart Diagrams with examples

Module-3: **[10L]**
6. Coding or Programming (2L)
- Programming Principles and Guidelines – Structured Programming, Code Re-use, Coding Standards / Guidelines
- Coding Process – Incremental Coding, Test Driven Development, Pair Programming / Extreme Programming