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

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

- Source Code Version Control, Build, Code Refactoring

7. Review and Testing (8L)

- Self Review / Peer Review
- Testing Overview -- Objective, Definition, Static and Dynamic Testing, Functional vs. Non-functional Testing
- Testing Artifacts – Test Cases and Test Suites, Traceability Matrix , Test Data , Stub and Driver
- Testing Process – Test Case Design, Test Case Execution, Test Result, Defect Logging and Tracking
- Testing Methods -- White Box Testing with Test Coverage using Control Flow Graph (CFG) and Cyclomatic Complexity, Black Box Testing with Equivalence Class Partitioning and Boundary Value Analysis,
- Testing Level – Unit Testing, Integration Testing, System Testing, (User) Acceptance Testing, Regression Testing, Performance Testing, Usability Testing, Non-functional Testing

Module-4:[10L]

8. Software Maintenance (2L)

- Types of Maintenance – Corrective, Preventive, Adaptive Change Management and Maintenance Process Software Estimation (3L)

9. Software Estimation (3L)

- Overview of Software Estimation – Size, Effort, Duration and Cost
- Size Estimation Methods – Lines of Code (LOC) and Function Points (FP)
- Estimation of Effort and Duration based on Size and Productivity
- Constructive Cost Model (COCOMO) – Basic COCOMO, Intermediate COCOMO (COCOMO 81), Detailed COCOMO (COCOMO II)

10. Project Management (3L)

- Project Management Overview -- Planning, Staffing, Execution, Monitoring and Control
- Responsibilities of Project Manager
- Project Scheduling – Work Breakdown Structure (WBS) and Gantt Charts

11. Configuration Management (2L)

- Overview of Configuration Management - Identification, Control, Status Accounting, Audits
- Concept of Baseline, Versioning of Configurable Items (CI)

Learning Objectives/Course Outcomes:

1) Knowledge and Understanding of:
   a) the system development lifecycle and associated models;
   b) the software-development process, including requirements analysis, design, coding, testing and maintenance;
   c) the basic principles of function-oriented and object-oriented software development with modular approach
   d) the essentials of software estimation and project planning
   e) the basics of software configuration management
   f) the fundamentals of software project risk management.
2) Ability to:
   a) prepare software requirement specifications as per IEEE guidelines
   b) model function-oriented and object-oriented software systems using industry-standard techniques (e.g., DFD, ERD, UML);
   c) approach testing of software systems in a methodical manner
   d) estimate software size using industry-standard methods (e.g., FPA)
   e) work out software project schedule and staffing plan
   f) identify software project risks and their mitigation approach.

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

List of Electives

OPTIONS FOR ELECTIVE I (Even Semester)
CSEN 3280 Computer Graphics & Multimedia
CSEN 3281 Artificial Intelligence
CSEN 3282 Web technologies
CSEN 3283 Advanced Java Programming

OPTIONS FOR ELECTIVE I Lab* (Even Semester)
CSEN 3285 Computer Graphics & Multimedia Lab
CSEN 3286 Artificial Intelligence Lab
CSEN 3287 Web technologies Lab
CSEN 3288 Advanced Java Programming Lab

Course Name : Computer graphics and multimedia					
Course Code: CSEN3280					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	**0**	**0**	**3**	**3**

Module I:
Introduction to computer graphics & graphics systems [6L]: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.
Scan conversion: [6L]: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Module II:
2D transformation & viewing [8L]: Basic transformations: translation , rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines , parallel lines, intersecting lines. Viewing pipeline, Window to viewport co-ordinate transformation, clipping operations, point clipping , line clipping, clipping circles , polygons & ellipse.
3D transformation & viewing [7L]: 3D transformations: translation, rotation, scaling & other transformations. rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, viewport clipping, 3D viewing.

Module III:
Curves [3L]: Curve representation, surfaces , designs , Bezier curves , B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves.
Hidden surfaces [3L]: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry.
Color & shading models [2L]: Light & color model; interpolative shading model; Texture.

Module IV:
Multimedia [10L]: Introduction to Multimedia: Concepts, uses of multimedia, hypertext and hypermedia.; Image, video and audio standards.
Audio: digital audio, MIDI, processing sound, sampling, compression.
Video: MPEG compression standards, compression through spatial and temporal redundancy, inter-frame and intra-frame compression .
Animation: types, techniques, key frame animation, utility, morphing. Virtual Reality concepts.