Fifth Semester

BTES501-18	Enterprise Resource Planning	3L:0T:0P	3 Credits

Course Details:

UNIT 1 INTRODUCTION

ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM [9hrs., CO1]

UNIT II ERP IMPLEMENTATION

ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring [9hrs., CO2]

UNIT III THE BUSINESS MODULES

Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution [9hrs., CO3]

UNIT IV THE ERP MARKET

ERP Market Place, SAP AG, Peoplesoft, Baan, JD Edwards, Oracle, QAD, SSA [9hrs., CO4]

UNIT V ERP – PRESENT AND FUTURE

Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions

[6hrs., CO1]

TEXT BOOK

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000

REFERENCES

1. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology, USA, 2001.

2. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Concepts and Practice”, PHI, New Delhi, 2003

Course outcomes: The students at the end will be able;

CO1: To know the basics of ERP

CO2: To understand the key implementation issues of ERP

CO3: To know the business modules of ERP

CO4: To be aware of some popular products in the area of ERP

Course Code: BTCS501-18	Course Title: Database Management Systems	3L:0T:0P	3Credits

Detailed Contents:

Module 1: Database system architecture

Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented Data models, integrity constraints, data manipulation operations.

[7hrs] (CO1,2)

Module 2: Relational query languages

Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms. **[10hrs] (CO2,4)**

Module 3:

Storage strategies, Indices, B-trees, hashing. **[3hrs] (CO3)**

Module 4: Transaction processing

Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery. **[6hrs] (CO3)**

Module 5: Database Security

Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection. **[8hrs] (CO 4,5)**

Module 6: Advanced Topics

Object oriented and object relational databases, Logical databases, Web databases, Distributed databases. **[8hrs] (CO 5)**

Course Outcomes:

At the end of study the student shall be able to:

CO1: write relational algebra expressions for a query and optimize the Developed expressions
CO2: design the databases using ER method and normalization.
CO3: construct the SQL queries for Open source and Commercial DBMS-MYSQL, ORACLE, and DB2.
CO4: determine the transaction atomicity, consistency, isolation, and durability.
CO5: Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

Text Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

Reference Books:

1. "Principles of Database and Knowledge–Base Systems", Vol1 by J. D. Ullman, Computer Science Press.
2. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education.
3. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley.

Course Code: BTCS502-18	**Course Title:** Formal Language & Automata Theory	**3L:1T:0P**	**3Credits**	**42 Hours**

Detailed Contents

Module 1: Introduction
Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages. **[3hrs] (CO1)**

Module 2: Regular languages and finite automata:
Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata. **[8hrs] (CO2)**

Module 3: Context-free languages and pushdown automata
Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs. **[8hrs] (CO3)**

Module 4: Context-sensitive languages
Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG. **[5hrs] (CO4)**

Module 5: Turing machines
The basic model for Turing machines (TM), Turing recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators. **[8hrs] (CO 5)**

Module 6: Undecidability & Intractablity:
Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages.
Intractablity: Notion of tractability/feasibility. The classes NP and co-NP, their importance. Polynomial time many-one reduction. Completeness under this reduction. Cook-Levin theorem: NP-completeness of propositional satisfiability, other variants of satisfiability. NP-complete

problems from other domains: graphs (clique, vertex cover, independent sets, Hamiltonian cycle), number problem (partition), set cover **[12hrs] (CO5)**

Course Outcomes: The student will be able to:

CO1: Write a formal notation for strings, languages and machines.

CO2: Design finite automata to accept a set of strings of a language.

CO3: Design context free grammars to generate strings of context free language .

CO4: Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars

CO5: Distinguish between computability and non-computability and Decidability and undecidability.

Text Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.

Reference Books:

1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
2. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
3. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
4. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

Course Code: BTCS503-18	**Course Title:** Software Engineering	**3L:1T:0P**	**3Credits**	**42 Hours**

Detailed Contents:

Module 1:

Evolution and impact of Software engineering, software life cycle models: Waterfall, prototyping, Evolutionary, and Spiral models. Feasibility study, Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification.

[10hrs] **(CO 1)**

Module 2:

Basic issues in software design, modularity, cohesion, coupling and layering, function-oriented software design: DFD and Structure chart, object modeling using UML, Object-oriented software development, user interface design. Coding standards and Code review techniques.

[8hrs] **(CO2)**

Module 3:

Fundamentals of testing, White-box, and black-box testing, Test coverage analysis and test case design techniques, mutation testing, Static and dynamic analysis, Software reliability metrics, reliability growth modeling. **[10hrs]** **(CO 3)**

Module 4:
Software project management, Project planning and control, cost estimation, project scheduling using PERT and GANTT charts, cost-time relations: Rayleigh-Norden results, quality management **[8hrs]** **(CO4)**

Module 5:
ISO and SEI CMMI, PSP and Six Sigma. Computer aided software engineering, software maintenance, software reuse, Component-based software development.

[6hrs] **(CO5)**

Text Books:

1. Roger Pressman, "Software Engineering: A Practitioners Approach,(6th Edition), McGraw Hill, 1997.

Reference Books:

1. Sommerville, "Software Engineering, 7th edition", Adison Wesley, 1996.
2. Watts Humphrey, "Managing software process", Pearson education, 2003.
3. James F. Peters and Witold Pedrycz, " Software Engineering – An Engineering Approach", Wiley.
4. Mouratidis and Giorgini. "Integrating Security and Software Engineering–Advances and Future", IGP. ISBN – 1-59904-148-0.
5. Pankaj Jalote, "An integrated approach to Software Engineering", Springer/Narosa.
6. Fundamentals of Software Engineering by Rajib Mall, – PHI-3rd Edition, 2009.

Course Outcomes:

At the end of the course the student should be able to:

CO 1: Students should be able to identify the need for engineering approach to software development and various processes of requirements analysis for software engineering problems.

CO 2: Analyse various software engineering models and apply methods for design and development of software projects.

CO 3: Work with various techniques, metrics and strategies for Testing software projects.

CO 4: Identify and apply the principles, processes and main knowledge areas for Software Project Management

CO 5: Proficiently apply standards, CASE tools and techniques for engineering software projects

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Course Code: BTCS 504-18	**Course Title:** Computer Networks	**3L:1T:0P**	**3Credits**	**42 Hours**

Detailed Contents:

Module 1: Data Communication Components
Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

[8hrs] (CO1)

Module 2: Data Link Layer and Medium Access Sub Layer
Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CDCDMA/CA. **[10 hrs] (CO2)**

Module 3: Network Layer
Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols. **[8 hrs] (CO3)**

Module 4: Transport Layer
Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm. **[8 hrs] (CO3)**

Module 5: Application Layer
Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.

[8 hrs] (CO4)

Course Outcomes: The student will be able to:

CO1: Explain the functions of the different layer of the OSI Protocol;

CO2:. Describe the function of each block of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs);

CO3: Develop the network programming for a given problem related TCP/IP protocol; &

CO4: Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

Text Books:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.

Reference Books:

1. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
2. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
3. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

Course Code: BTCS505-18	**CourseTitle:** Database management System lab	**0L:0T:4P**	**2Credits**

List of Experiments:

Task 1: Introduction to SQL and installation of SQL Server / Oracle.
Task 2: Data Types, Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements.
Task 3: Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements.
Task 4: Set Operators, Nested Queries, Joins, Sequences.
Task 5: Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.
Task 6: PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.
Task 7: Stored Procedures and Exception Handling.
Task 8: Triggers and Cursor Management in PL/SQL.

***Suggested Tools* –** MySQL, DB2, Oracle, SQL Server 2012, Postgre SQL, SQL lite

Course Outcomes:

CO1: This practical will enable students to retrieve data from relational databases using SQL.

CO2: students will be able to implement generation of tables using datatypes

CO3: Students will be able to design and execute the various data manipulation queries.

CO4: Students will also learn to execute triggers, cursors, stored procedures etc.

Course Code: BTCS506-18	**Course Title:** Software Engineering Lab	**0L:0T:2P**	**1 Credits**

List of Experiments:

Task 1: Study and usage of OpenProj or similar software to draft a project plan

Task 2: Study and usage of OpenProj or similar software to track the progress of a project
Task 3: Preparation of Software Requirement Specification Document, Design Documents and Testing Phase
Task 4: related documents for some problems
Task 5: Preparation of Software Configuration Management and Risk Management related documents
Task 6: Study and usage of any Design phase CASE tool
Task 7: To perform unit testing and integration testing
Task 8: To perform various white box and black box testing techniques
Task 9: Testing of a web site

Suggested Tools **-** Visual Paradigm, Rational Software Architect. Visio, Argo UML, Rational Application Developer etc. platforms.

Course Code: BTCS507-18	**Course Title:** Computer Networks Lab	**0L:0T:2P**	**1 Credits**

List of Experiments:

Task 1: To study the different types of Network cables and network topologies.
Task 2: Practically implement and test the cross-wired cable and straight through cable using clamping tool and network lab cable tester.
Task 3: Study and familiarization with various network devices.
Task 4: Familiarization with Packet Tracer Simulation tool/any other related tool.
Task 5: Study and Implementation of IP Addressing Schemes
Task 6: Creation of Simple Networking topologies using hubs and switches
Task 7: Simulation of web traffic in Packet Tracer
Task 8: Study and implementation of various router configuration commands
Task 9: Creation of Networks using routers.
Task 10: Configuring networks using the concept of subnetting
Task 11: Practical implementation of basic network command and Network configuration commands like ping, ipconfig, netstat, tracert etc. for troubleshooting network related problems.
Task 12: Configuration of networks using static and default routes.

Course Outcomes:
The students will be able to:

CO1: Know about the various networking devices, tools and also understand the implementation of network topologies;
CO2: Create various networking cables and know how to test these cables;
CO3: Create and configure networks in packet trace rtool using various network devices and topologies;
CO4: Understand IP addressing and configure networks using the subnet in;
CO5: Configure routers using various router configuration commands.

Suggested Tools **- NS2/3, Cisco packet tracer, Netsim etc.**.

ELECTIVES- I

Course Code: BTCS 510-18	**Course Title:** Programming in Python	**3L:0T:0P**	**3 Credits**	**42 Hours**

Detailed Contents:

Module 1:
Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types.

[8hrs] (CO1)

Module 2:
FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules
Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, *Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules
Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules.

[10hrs] (CO1,2)

Module 3:
Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

[8hrs] (CO 2,3)

Module 4:
GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs
WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers. **[10hrs] (CO 4,6)**

Module 5:
Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules. **[6 hrs] (CO5)**

Text Books:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

Course Outcomes:

The students should be able to:

CO1: Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
CO2: Demonstrate proficiency in handling Strings and File Systems.
CO3: Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
CO4: Interpret the concepts of Object-Oriented Programming as used in Python.
CO5: Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

Course Code: BTCS 513-18	**Course Title:** Programming in Python Lab	**0L:0T:2P**	**1 Credits**	**2 Hours/ week**

Prerequisites: Students should install Python.

List of Experiments:

Task 1: Write a program to demonstrate different number data types in Python.
Task 2: Write a program to perform different Arithmetic Operations on numbers in Python.
Task 3: Write a program to create, concatenate and print a string and accessing sub-string from a given string.
Task 4: Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
Task 5: Write a program to create, append, and remove lists in python.
Task 6: Write a program to demonstrate working with tuples in python.
Task 7: Write a program to demonstrate working with dictionaries in python.
Task 8: Write a python program to find largest of three numbers.
Task 9: Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula: c/5 = f-32/9]
Task 10: Write a Python program to construct the following pattern, using a nested for loop

```
*
* *
* * *
* * * *
* * *
* *
*
*
```

Task 11: Write a Python script that prints prime numbers less than 20.
Task 12: Write a python program to find factorial of a number using Recursion.
Task 13: Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides).
Task 14: Write a python program to define a module to find Fibonacci Numbers and import the module to another program.

Task 15: Write a python program to define a module and import a specific function in that module to another program.

Task 16: Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.

Task 17: Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.

Task 18: Write a Python class to convert an integer to a roman numeral.

Task 19: Write a Python class to implement pow(x, n)

Task 20: Write a Python class to reverse a string word by word.

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cCourse Code: BTCS521-	**Course Title:** Computational Biology	**3L:0T:0P**	**3 Credits**	**42 Hours**

Detailed Contents:

Module 1: Introduction

Nature and scope of life science: Branches of life sciences, Characteristics of life, Levels of Organization, Origin of life, Biochemical evolution- evolution of Proteins and Nucleotide. ***Cell Biology***: The cell as basic unit of life- Prokaryotic cell and Eukaryotic cell, Cell Structure and Function- cell membrane, cell organelles, Cell Division; Mitosis & Meiosis. ***Cell Energetics***: Laws of Thermodynamics, Photosynthesis, Anaerobic & aerobic respiration, Structure and function of mitochondria, respiratory pathways: Glycolysis, Kreb's Cycle, Electron transport chain.

[10hrs] (CO)

Module 2: More about RNA and DNA

Chromosome-Genome-Genes-Databases: Bio-molecules- DNA, RNA, Protein and amino acids, Chargaff's Rules, GC content.

Central Dogma: Replication, Transcription, Translation, Post transcriptional & post translational modifications, RNA processing, RNA splicing and RNA editing. Sense/coding and anti-sense/template strands, Genetic code. Introduction to DNA and Protein sequencing.

[10hrs] (CO)

Module 3: Proteins

Proteins and Databases: Protein structure and function, Protein Primary structure, Amino acid residues, Secondary, Tertiary, Quaternary Structure of Protein, Protein sequence databases- SwissProt/ TrEMBL, PIR, Sequence motif databases -Pfam, PROSITE, Protein structure databases.

[8hrs] (CO)

Module 4: Computation and Biology

Molecular computational biology: Gene prediction, sequencing genomes, similarity search, restriction mapping, ***Sequence Analysis***: Principles and its uses, Hidden Markov models for sequence analysis. Introduction of Markov Chain and Hidden Markov models. Forward backward algorithm, Viterbi and Baum-Welch algorithms,

[14hrs] (CO)

Course Outcomes:

The student will be able to:

CO1: Understand the basic of cell structure, divisions involved in reproduction of a cell, and its generic functionality;

CO2: Recognize the base line elements of a RNA and DNA; including fundamental behind

their complex structure;

CO3: Comprehend primary structure of the protein and various related data-sets.

CO4: Demonstrate the concept of gene sequence alignment and simulate various related algorithms for the same.

Text books

1. Pevzner, P. A., Computational Molecular Biology, PHI Learning Pvt. Ltd, ISBN-978-81-203-2550-0.
2. Ghosh, Z. and Mallick, B., Bioinformatics Principles and Applications (2008) Oxford University Press ISBN 9780195692303
3. Mount, D. W., Bioinformatics – sequence and genome analysis.

Reference Books

1. Devasena, T. (2012). Cell Biology. Published by Oxford University Press.
2. Fall, C.P., Marland, E.S., Wagner, J.M., Tyson, J.J.(2002). Computational Cell Biology. Springer
3. Becker, W. M., Kleinsmith, L. J., Hardin, J., & Raasch, J. (2003). The world of the cell (Vol. 6). San Francisco: Benjamin Cummings.
4. Rastogi, S. C. (2005). Cell biology. New Age International.
5. Reece, J. B., Taylor, M. R., Simon, E. J., & Dickey, J. (2009). Biology: concepts & connections (Vol. 3, p. 2). Pearson/Benjamin Cummings.

Course Code: BTCS523-18	**Course Title:** Computational Biology Lab	**0L:0T:2P**	**1 Credits**	**2 Hours/ week**

List of Experiments:

Task 1: Introduction of Bio Python, Various Packages and its Installation.

Task 2,3: Parsing sequence file formats
- Sequences and Alphabets
- Sequences act like strings
- Slicing a sequence
- Turning Seq objects into strings
- Concatenating or adding sequences
- Changing case
- Nucleotide sequences and (reverse) complements
- Transcription
- Translation

Task 4,5: Sequence annotation objects
- The SeqRecord object
- Creating a SeqRecord
  - SeqRecord objects from scratch
  - SeqRecord objects from FASTA files
  - SeqRecord objects from GenBank files
- Feature, location and position objects
  - SeqFeature objects
  - Positions and locations
  - Sequence described by a feature or location

Task 6,7,8: BLAST

- Running BLAST over the Internet
- Running BLAST locally
  - Introduction
  - Standalone NCBI BLAST+
  - Other versions of BLAST
- Parsing BLAST output
- The BLAST record class
- Dealing with PSI-BLAST
- Dealing with RPS-BLAST

BLAST and other sequence search tools

- The SearchIO object model
  - QueryResult
  - Hit
  - HSP
  - HSPFragment
- A note about standards and conventions
- Reading search output files
- Dealing with large search output files with indexing
- Writing and converting search output files

Task 9,10: Multiple Sequence Alignment objects

- Parsing or Reading Sequence Alignments
  - Single Alignments
  - Multiple Alignments
  - Ambiguous Alignments
- Writing Alignments
  - Converting between sequence alignment file formats
  - Getting your alignment objects as formatted strings
- Manipulating Alignments
  - Slicing alignments
  - Alignments as arrays

Task 11,12,13: Sequence motif analysis using Bio.motifs

- Motif objects
  - Creating a motif from instances
  - Creating a sequence logo
- Reading motifs
  - JASPAR
  - MEME
  - TRANSFAC
- Writing motifs
- Position-Weight Matrices

Quick Reference:
http://biopython.org/DIST/docs/tutorial/Tutorial.html#htoc106
https://biopython.readthedocs.io/en/latest/Tutorial/chapter_seq_objects.html

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Course Code: BTCS 515-18	**Course Title:** Computer Graphics	**3L:0T:0P**	**3 Credits**	**45 Hours**

Detailed Contents:

Module 1:
Overview of Computer Graphics: Basics of Computer Graphics, Applications, Video Display devices, Raster–Scan displays, Random–Scan displays, Color CRT Monitors, Flat–Panel Displays; Video Controller, Display Processor, Common Graphic Input and Output devices, Graphic File Formats, Graphics Software's.

[6hrs] **(CO1)**

Module 2:
Output Primitives: Line Drawing, DDA, Bresenham Line Algorithm; Mid-Point Line Algorithm, Bresenham Circle Algorithm, Midpoint Circle drawing algorithms; Midpoint Ellipse Algorithm; Flood and Boundary Filling.

[6hrs] **(CO1)**

Module 3:
Two-Dimensional Geometric Transformation: Translation, Rotation, Scaling, Reflection, Shearing, Matrix representations; Composite transformations.

[6hrs] **(CO1,2)**

Module 4:
Two-Dimensional Viewing: Viewing coordinate reference frame; Window to Viewport coordinate transformation. Point Clipping, Line Clipping, text Clipping; Cohen–Sutherland and Liang–Barskey Algorithms for line clipping; Sutherland–Hodgeman algorithm for polygon clipping.

[6hrs](CO2)

Module 5:
Three Dimensional Transformations & Viewing: Translation, Rotation, Scaling, Reflection and composite transformations. Parallel and Perspective Projections, Viewing Transformation: View Plan, View Volumes and Clipping.

[6hrs] **(CO2)**

Module 6:
3 D Graphics and Visibility: Plane projections and its types, Vanishing points, Specification of a 3D view. Image and object precision, Hidden edge/surface removal or visible edge/surface determination techniques; z buffer algorithms, Depth sort algorithm, Scan line algorithm and Floating horizon technique.

[6hrs] **(CO2,3)**

Module 7:
Color Models: Properties of Light, Intuitive Color Concepts, concepts of chromaticity, RGB Color Model, CMY Color Model, HLS and HSV Color Models, Conversion between RGB and CMY color Models, Conversion between HSV and RGB color models, Color Selection and Applications.

[6hrs] **(CO2,3)**

Module 8:
Animation: Graphics Design of Animation sequences, General Computer Animation Functions Introduction to Rendering, Raytracing, Antialiasing, Fractals, Gourard and Phong shading.

[3hrs] **(CO3)**

Reference Books:

1. D. Hearn and M.P. Baker, Computer Graphics: C version, 2nd Edition, PHI, 2004.
2. D.F. Rogers, Mathematical Elements for Graphics, 2nd Edition., McGraw Hill, 2004.
3. J.D. Foley et al, Computer Graphics, Principles and Practices, 2nd Edition, Addison Wasley, 2004.
4. Roy A. Plastock, Gordon Kalley, Computer Graphics, Schaum's Outline Series, 1986.

Course Outcomes: The students shall be able to:

CO1: Understand about fundamentals of Graphics to enable them to design animated scenes for virtual object creations.

CO2: Make the student present the content graphically.

CO3: Work in computer aided design for content presentation for better analogy data with pictorial representation

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Course Code: BTCS 518-18	**Course Title:** Computer Graphics Lab	**0L:0T:4P**	**2 Credits**	**2 Hours/ week**

List of Experiments:

Task 1: WAP to draw different geometric structures using different functions.
Task 2: Implement DDA line generating algorithm.
Task 3: Implement Bresenham's line generating algorithm.
Task 4: Implement Mid-point circle line generating algorithm.
Task 5: Implementation of Bresenham's circle drawing algorithm.
Task 6: Implementation of mid-point circle generating Algorithm.
Task 7: Implementation of ellipse generating Algorithm.
Task 8: WAP of color filling the polygon using Boundary fill and Flood fill algorithm.
Task 9: To translate an object with translation parameters in X and Y directions.
Task 10: To scale an object with scaling factors along X and Y directions.
Task 11: Program of line clipping using Cohen-Sutherland algorithm.
Task 12: To perform composite transformations of an object.
Task 13: To perform the reflection of an object about major.

Course Code: BTCS 520-18	**Course Title:** Web Technologies	**3L:0T:0P**	**3 Credits**	**42 Hours**

Detailed Contents:

Module 1:

Introduction: History and evolution of Internet protocols, Internet addressing, Internet Service Provider (ISP), Introduction to WWW, DNS, URL, HTTP, HTTPS, SSL, Web browsers,

Cookies, Web servers, Proxy servers, Web applications. Website design principles, planning the site and navigation. [6 hrs][CO1]

Module 2:

HTML and DHTML: Introduction to HTML and DHTML, History of HTML, Structure of HTML Document: Text Basics, Structure of HTML Document: Images, Multimedia, Links,

Audio, Video, Table and Forms, Document Layout, HTML vs. DHTML, Meta tags, Browser architecture and Website structure. Overview and features of HTML5.

[7 hrs][CO2]

Module 3:

Style Sheets: Need for CSS, Introduction to CSS, Basic syntax and structure, Types of CSS – Inline, Internal and External CSS style sheets.CSS Properties - Background images, Colors and properties,Text Formatting, Margin, Padding, Positioning etc., Overview and features of CSS3.

[7 hrs][CO3]

Module 4:

Java Script: Introduction, JavaScript's history and versions, Basic syntax, Variables, Data types, Statements, Operators, Functions, Arrays, Objects, dialog boxes, JavaScript DOM.

[7 hrs][CO4]

Module 5:

PHP and MySQL: Introduction and basic syntax of PHP, Data types, Variables,Decision and looping with examples, String, Functions, Array, Form processing, Cookies and Sessions, E-mail, PHP-MySQL: Connection to server.

[7 hrs][CO5]

Module 6:

Ajax and JSON: AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax, Advantages & disadvantages, HTTP request, XMLHttpRequest Server Response.

JSON– Syntax, Schema, Data types, Objects, Reading and writing JSON on client and server. Using JSON in AJAX applications. [8 hrs][CO6]

Students shall be able to:

CO1. Understand and apply the knowledge of web technology stack to deploy various web services.

CO2. Analyze and evaluate web technology components for formulating web related problems.

CO3. Design and develop interactive client server internet application that accommodates user specific requirements and constraint analysis.

CO4. Program latest web technologies and tools by creating dynamic pages with an understanding of functions and objects.

CO5. Apply advance concepts of web interface and database to build web projects in multidisciplinary environments.

CO6. Demonstrate the use of advance technologies in dynamic websites to provide performance efficiency and reliability for customer satisfaction.

Text Books:

1. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", PearsonEducation
2. Rajkamal, "Internet and Web Technology", Tata McGraw Hill
3. Ray Rischpater, "JavaScript JSON Cookbook", Packt Publishing.
4. Ivan Bayross, "Web Enabled Commercial Application Development using HTML, DHTML JavaScript, Perl, CGI", BPB Publications.
5. Peter Moulding, "PHP Black Book", Coriolis.

Course Code: BTCS 522-18	**Course Title:** Web Technologies Lab	**0L:0T:2P**	**1 credits**	**2 Hours/ week**

List of Experiments:

1. Configuration and administration Apache Web Server.
2. Develop an HTML page to demonstrate the use of basic HTML tags, Link to different HTML page and also link within a page, insertion of images and creation of tables.
3. Develop a registration form by using various form elements like input box, text area, radio buttons, check boxes etc.
4. Design an HTML page by using the concept of internal, inline, external style sheets.
5. Create an HTML file to implement the styles related to text, fonts, links using cascading style sheets
6. Create an HTML file to implement the concept of document object model using JavaScript
7. Create an HTML page including JavaScript that takes a given set of integer numbers and shows them after sorting in descending order.
8. Write an HTML page including any required JavaScript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result box.
9. Create a PHP file to print any text using variable.
10. Demonstrate the use of Loops and arrays in PHP
11. Create a PHP file using GET and POST methods.
12. A simple calculator web application that takes two numbers and an operator (+, -, /, * and %) from an HTML page and returns the result page with the operation performed on the operands.
13. Implement login page contains the user name and the password of the user to authenticate with Session using PHP and MySQL, also implement this with the help of PHP-Ajax.
14. A web application for implementation:
    a. The user is first served a login page which takes user's name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions.
    b. If name and password matches, serves a welcome page with user's full name.
    c. If name matches and password doesn't match, then serves "password mismatch" page
    d. If name is not found in the database, serves a registration page, where user's full name is asked and on submitting the full name, it stores, the login name, password and full name in the database (hint: use session for storing the submitted login name and password)
15. Demonstrate the use of Ajax and JSON Technologies in programming examples.

16. Demonstrate the use of web site designing tools such as Joomla, WordPress.
17. Implement at least one minor project using different technologies mentioned in theory of the subject.