Sixth Semester
Punjab Technical University  
B.Tech. Computer Science Engineering (CSE)

BTCS 601 Simulation and Modeling

**Objectives:** This course should provide the students with good understanding of various techniques of Simulation.

**Module 1:** Introduction- When simulation is appropriate and when not, advantages and disadvantages of simulation, application areas in communication, computer and software design, systems and systems environment, components of a system, discrete and continuous systems, model of a system, types of models, discrete-event simulation, steps in a simulation study. Simulation Examples- Simulation of queueing systems, on-demand and inventory systems, simulation for reliability analysis etc

**Module 2:** General Principles- Concepts in discrete event simulation: event scheduling/time advance algorithms, world views. List Processing: properties and operations, data structures and dynamic allocation, techniques;

**Module 3:** Simulation Software- Integrated environments. Examples and review of some existing software popular and useful in the industry, e.g., Arena, AutoMod, Extend, Flexsim, Micro Saint, ProModel, Quest, SIMUL8, WITNESS etc. Simulation using languages and environments like C++/Java/GPSS/SSF etc. Experimentation and Statistical-Analysis Tools: common features and relevant current products.


**Module 5:** Application of Queueing Models- Review of Characteristics (calling population system capacity, arrival processes, behavior and disciplines, service times and mechanisms etc) and notations, Application of Long-Run Measures of Performance: Time average in system, average time spent per customer, Little's Formula and server utilization, costs. Steady State behaviour of Infinite (M/G/1, M/M/c/infinity, M/M/c/N/infinity) and finite (M/M/c/K,K) Calling Population Models, Use of Network of Queues.


**Module 7:** Input Modeling- Data collection, Identifying the Distribution with Data: Histograms, Selection of the Appropriate Family of Distributions, Quantile-Quantile Plots.100 Parameter Estimation: Sample Mean and Sample Variance and various biased and unbiased Estimators. Goodness of Fit Tests applied to


Simulation Languages: Basic Introduction to Special Simulation Languages: GPSS/ MATLAB/ Network Simulators.

Suggested Readings/ Books:

BTCS 602 RDBMS–II

Objectives: This course offers a good understanding of advanced database concepts and technologies. It prepares the student to be in a position to use and design databases for a variety of applications.

Introduction to Database Systems: Database System Concepts and Architecture, Data Models, Data Independence, SQL: DDL, DML, DCL, Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF. (6)

Query Processing and Optimization:
Query Processing, Syntax Analyzer, Query Decomposition, Query Optimization, Heuristic Query Optimization, Cost Estimation, Cost Functions for Select, Join, Query Evaluation Plans. (6)

Transaction Processing and Concurrency Control:
Transaction Processing Concepts, Concurrency Control Techniques: Two-phase Locking, Timestamp Ordering, Multiversion, Validation, Multiple Granularity Locking. (5)

Object Oriented and Object Relational Databases:
Object Oriented Concepts, Object Oriented Data Model, Object Definition Language, Object Query Language, Object Relational Systems, SQL3, ORDBMS Design. (5)

Distributed Databases:
Distributed Database Concepts, Advantages and Disadvantages, Types of Distributed Database Systems, Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design, Five Level Schema Architecture, Query Processing, Concurrency Control and Recovery in Distributed Databases. (6)

Backup and Recovery:
Types of Database Failures, Types of Database Recovery, Recovery Techniques: Deferred Update, Immediate Update, Shadow Paging, Checkpoints, Buffer Management. (5)

Introduction to Data Warehousing and Data Mining:
Introduction to OLAP, OLTP, Data Warehouse, Data Marts, Data Mining, Data Mining Process, Big Data. (5)

Enterprise Database Products:
Enterprise Database Products, Familiarity with IBM DB2 Universal Database, Oracle, Microsoft SQL Server, MySQL, their features. (7)

Suggested Readings/ Books:
7. Chris Eaton, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data

BTCS 603 Software Engineering


Module2: 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.

Module3: 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.

Module4: Software project management, Project planning and control, cost estimation, project scheduling using PERT and GANTT charts, cost-time relations: Rayleigh-Norden results, quality management, ISO and SEI CMMI, PSP and Six Sigma. Computer aided software engineering, software maintenance, software reuse, Component-based software development.

Suggested Readings/ Books:

Elective-I
BTCS 901 Web Technologies (Elective-I)

INTERNET AND WORLD WIDE WEB: Introduction, Internet Addressing, ISP, types of Internet Connections, Introduction to WWW, WEB Browsers, WEB Servers, URLs, http, WEB applications, Tools for WEB site creation.

HTML: Introduction to HTML, Lists, adding graphics to HTML page, creating tables, linking documents, frames, DHTML and Style sheets.

JavaScript: Introduction, programming constructs: variables, operators and expressions, conditional checking, functions and dialog boxes, JavaScript DOM, creating forms, introduction to Cookies

JAVA: Introduction to java objects and classes, control statements, arrays, inheritance, polymorphism, Exception handling.

XML: Why XML, XML syntax rules, XML elements, XML attributes, XML DTD displaying XML with CSS.

AJAX: Introduction, HTTP request, XMLHttpRequest, AJAX Server Script, AJAX Database.

PHP: Introduction, syntax, statements, operators, sessions, E-mail, PHP and MySQL, PHP and AJAX.

Suggested Readings/Books:
3. Ivan Bayross: Web Enabled Commercial Application
4. Schafer: Development, BPB
5. HTML,CSS, JavaScript,Perl, Python and PHP, Wiley India Textbooks.

BTCS 902 Mobile Applications Development (Elective-I)

Unit I:
Introduction: Mobile operating system, Operating system structure, Constraints and Restrictions, Hardware configuration with mobile operating system, Features: Multitasking Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security, Multimedia features.

Unit II:
Introduction to Mobile development IDE's, Introduction to Worklight basics, Optimization, pages and fragments, Writing a basic program- in Worklight Studio, Client technologies, Client side debugging, Creating adapters, Invoking adapters from Worklight Client application, Common Controls, Using Java in adapters, Programming exercise with Skins, Understanding Apache Cordova, Offline access, Encrypted cache deprecated, Using JSONStore

Unit III:
Understanding Apple iOS development, Android development, Shell Development, Creating Java ME application, Exploring the Worklight Server, Working with UI frameworks, Authentication, Push notification, SMS Notifications, Globalization, WebView overlay, Creating Authentication application: development for Apple iOS by using a login module, Device Analytics, Worklight Server Administration

Unit IV:
**Punjab Technical University**

**B.Tech. Computer Science Engineering (CSE)**

**Windows Phone:** Introduction to Windows Phone, Architecture, memory management, communication protocols, application development methods, deployment.

**Case Study:** Design and development of Application using mobile application development platforms e.g. WorkLight, Kendo, Appcon, Xcode, Xpages

**Unit V:**

**Android:** Introduction to Android, Architecture, memory management, communication protocols, application development methods, deployment.

**Case Study:** Design and development of Application using mobile application development platforms e.g. WorkLight, Kendo, Appcon, Xcode, Xpages

**Unit VI:**

**iOS:** Introduction to iOS, Architecture, memory management, communication protocols, application development methods, deployment.

**Case Study:** Design and development of Application using mobile application development platforms e.g. WorkLight, Kendo, Appcon, Xcode, Xpages

**Suggested Readings/Books:**

4. Teach Yourself Android Application Development In 24 Hours, Edition: I, Publication: SAMS
5. Neal Goldstein, Tony Bove, “iPhone Application Development All-In-One For Dummies”, John Wiley & Sons
9. Worklight resources

**BTCS 903 Ethical Hacking (Elective-I)**

Introduction: Understanding the importance of security, Concept of ethical hacking and essential Terminologies-Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit. Phases involved in hacking

Foot printing: Authoritative, Non -Auth reply by DNS. Introduction to foot printing, Understanding the information gathering methodology of the hackers, Tools used for the reconnaissance phase.

Scanning: Detecting live systems on the target network, Discovering services running /listening on target systems, Understanding port scanning techniques, Identifying TCP and UDP services running on the target network, Understanding active and passive fingerprinting.

System Hacking: Aspect of remote password guessing, Role of eavesdropping ,Various methods of password cracking, Keystroke Loggers, Understanding Sniffers ,Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing.
Hacking Wireless Networks: Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic, Securing Wireless Networks.

Cryptography: Understand the use of Cryptography over the Internet through PKI, RSA, MD-5, Secure Hash Algorithm and Secure Socket Layer.

**Suggested Readings/Books:**

1. Network Security and Ethical Hacking, Rajat Khare, Luniver Press
2. Ethical Hacking, Thomas Mathew, OSB Publisher

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**BTCS 904 Information Security (Elective-I)**

**Objectives:** Upon completion of this course, students will have gained knowledge of information security concepts and understanding of Information Security principles and approaches.


**Module 5:** System Security- Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, Firewalls and its Design Principles.

**Suggested / Readings & Books**


**BT***

**Open Elective**

**BTCS 604 RDBMS-II Lab**

1. Case studies on normalization
2. Study and usage of query optimization techniques
3. Study and usage of backup and recovery features of database management software
4. Server administration of any database management software
5. Study and usage of any object oriented or object relational database management software
6. Study and usage of open source data mining tool: Weka
7. Study of web databases
8. Development of a project by making use of tools studied above

**BTCS 605 Free/Open Source Software Lab**

Students will be doing the practicals related to the **Elective-I** opted by them by using open source technologies available in the area of the subject.

**BTCS 606 Software Engineering Lab**

1. Study and usage of OpenProj or similar software to draft a project plan
2. Study and usage of OpenProj or similar software to track the progress of a project
4. Preparation of Software Configuration Management and Risk Management related documents
5. Study and usage of any Design phase CASE tool
6. To perform unit testing and integration testing
7. To perform various white box and black box testing techniques
8. Testing of a web site


**BTCS 607 Simulation and Modeling Lab**

1. **Programming in MATLAB:** Introduction, Branching statements, loops, functions, additional data types, plots, arrays, inputs/outputs etc.
2. Introduction regarding usage of any Network Simulator.