List of Electives and Audit Courses

VI Semester – Even 2017

Elective courses
1. Advanced Data Structures and Applications 2. Algorithm Design 3. Introduction to Mobile Application Development 4. Agile Software Development 5. Data and Web Mining 6. Computational Geometry and Topology 7. User Centered Design 8. Theory of Computational Complexity 9. Embedded Systems and Robotics 10. Wireless Networks 11. Computational Intelligence 12. Cloud based Enterprise Applications

Value Added / Audit Courses
1. Advanced Java Workshop (1-0-2) 2. Robotics Workshop (0-0-4) 3. Multimedia Workshop (0-0-4) 4. Computer Games Workshop (0-0-4) 5. Competitive Programming Workshop (1-0-2) 6. Parallel Programming Workshop (1-0-2) 7. Distributed Database Workshop (1-0-2) 8. Social Media Workshop (1-0-2) 9. Mobile Application Development Workshop (1-0-2) 10. Hive Workshop (1-0-2)

Course Outline – Even 2017
Elective Courses – VI Semester

16B1NCI631
Advanced Data Structures and Applications

Faculty: Vimal Kumar and Prantik Biswas

Amortized Complexity. Introduction to external sorting. Selection trees & k-way merging. Run generation. Optimal merging of runs. Buffering; Binary: Optimal Binary Search Tree, AVL , RB Tree, Splay tree ; Index-Tree: T-tree , Dancing tree, Bx tree; Heaps: Binary Heap, Binomial Heap, Fibonacci Heap, 2-3 heap, Pairing heap. Dictionaries; String Processing Data Structures : Rope, Tries, Suffix Tree; Multiway Trees: Ternary search tree, And-Or tree, (a-b)- tree, Link/cut tree; Space partitioning tree: Binary space partitioning, KD tree, Quad tree, Interval Tree, Segment Tree, Priority Search Tree; Hashes: Introduction, Cuckoo hashing, Coalesced hashing, Perfect hash function, Universal Hashing; Applications: Searching, Memory Indexing, Computer Graphics, Image Data Structures, Computational Biology

16B1NCI632
Algorithm Design

Faculty: Ankita Wadhwa

Introduction to algorithms: Review of types and approaches to design of algorithms and algorithm Efficiency. Power of randomization, efficiency of approximation; notion of P, NP, NP Completeness, reducibility. Approximation Algorithms: Tree based approximation like, Steiner Tree and TSP, Graph based approximation like Precedence constrained scheduling and shortest superstring, approximation schemes. Heuristic based algorithms for optimization problems: Swarm based algorithms, Multi objective optimization algorithms and their applications to solve combinatorial problems (TSP, 0/1 Knapsack, Scheduling etc). Randomization: Introduction to probability and randomized algorithms, randomized quick sort, minimum cut algorithm, bins-balls Problem.

16B1NCI633
Introduction to Mobile Application Development

Faculty: K Rajalakshmi

Introduction to Mobile Application Development its various tool and platform. Android Architecture Android Programming–Installation Procedure of various tools that are required for Android Programming, Programming activity, Intent for single activity, Intent handling for multiple activity, Passing objects using intents, Understanding Android User Interfaces (components of screen, changing display orientation, managing screen orientation, UI programming, UI notification), Layouts, Views

16B1NCI634
Agile Software Development

Faculty: Indu Chawla and Purtee Kohli

Introduction to Agile and Lean Software Development: Basics and Fundamentals, Agile Principles: Agile Manifesto, Scrum and Extreme Programming, Twelve Practices of XP, Agile project management: communication, planning, estimation, quality, risk metrics and measurements, Agile Requirements : User Stories, Backlog Management, Agile Architecture : Feature-Driven Development, Agile Risk Management: Risk and Quality Assurance, Agile Review : Agile Metrics and Measurements, Agile Testing : Test-Driven Development, User Acceptance Test, Scaling Agile for large projects : Scrum of Scrums, Team collaborations, Case studies based on Agile methodology

16B1NCI635
Data and Web Mining

Faculty: Neetu S., Anuja A., and Megha R.

Introduction data mining, Different Types, Measurement Scales and Similarity Measures of Datasets, of Data Mining systems, Data Warehouse and OLAP Technology, Multidimensional Data Model, Data Preprocessing, knowledge representation, Attribute-oriented analysis, Classification and Prediction, Accuracy and Error measures, evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods, Clustering, Association Rules, Outlier Analysis, Mining Time-Series Data, Graph Mining, Multi-relational Data Mining, Multidimensional Analysis. Text Mining, Web Mining, Crawling, web Search and retrieval, Evaluating search effectiveness, Web Caching algorithms, Website Optimization Algorithms, Semantic Web, Indexing, Ranking algorithms, Semantic Search, Ontology Mapping, Match Making, Recommendation Algorithms, Clustering/community algorithms, Topical locality.

16B1NCI636
Computational Geometry and Topology

Faculty: Rohit Pal Singh and Mahendra Gurve

Convex Hulls – Various Computing Techniques. Degeneracy Problem, Plane Sweep Algorithms, Polygon Triangulation - Famous Art Gallery Problem, Convex Partitioning, Linear Programming Orthogonal Search, Voronoi Diagrams - Nearest ATM Location Problem, Delaunay Triangulations; Randomized incremental Algorithms, Surface Reconstruction and Simplification, Topology and Geometry, Topological Sweep, Robot motion Planning.

16B1NCI639
User Centered Design

Faculty: Sanjay Goel

Foundations and perspectives of design theory, Theories of human needs, desires and motivation, task division humans and artefacts, Human-technology relationship, role of artifacts wrt human needs and wellbeing, Affordance, Usability: taxonomy of usability, taxonomy of context of use, usability guidelines, playability guidelines for computer games,
Cognitive Science Based design principles: perception, attention, memory, problem solving, learning and conceptual modeling, real time deadlines

16B1NCI640
Theory of Computational Complexity

Faculty: Mukta Goyal

Models of Computation:-Deterministic Turing machines, Equivalent Turing machines, Register machines. Languages:- Language recognition. Language acceptance. Recursive languages.
Recursively enumerable languages. Undecidability:-The Halting Problem. Problem reduction. Undecidability of the tiling problem. Undecidability of first-order logic. Other unsolvable problems. Non-determinism:- Non-deterministic Turing machines. Polynomial-time reduction.
Elementary properties of polynomial time reduction. The complexity classes P, NP, NP-complete. Cook's theorem. How to prove NP-hardness of various problems. Probabilistic Algorithms:- Complexity analysis of probabilistic algorithms, The complexity classes PP and BPP. Other Complexity Classes, Space complexity, Savitch's theorem, Exponential time, Non-elementary problems.

16B1NCI641
Embedded Systems and Robotics

Faculty: Hema N.

Introduction to embedded system, embedded hardware: overview of microprocessor and microcontroller, Introduction to 8051 (architecture, instructions set, addressing, peripherals on chip), ARM processor (scope, architecture, instructions, interrupt processing, assembly language programming), memory (memory organization, virtual memory and memory management), bus interfaces, serial interface, power aware architecture, system on chip, compilers of embedded system. Introduction to Extensive Field of ROBOTICS, Application of Robotics: Industrial, Medical, Entertainment, Elements of robots - joints, links, actuators, and sensors, Kinematics of serial robots, Motion planning and control, Modeling and analysis of wheeled mobile robots, computer vision for navigation, Case study: Bipedal robots

16B1NCI642
Wireless Networks

Faculty: Gagandeep K., Kavita M., and Raghu V.

Architecture and applications of current and next generation wireless networks. Key concepts and techniques underlying modern physical layer wireless and mobile communications, Aloha and CSMA based randomized medium access, scheduling for TDMA/FDMA/CDMA-based wireless networks. Network layer routing protocols, key component mechanisms, link metric estimation and neighbourhood table management for proactive and reactive routing protocols, opportunistic routing, backpressure routing, network coding, cooperative routing, routing with mobility and intermittent contacts. Transport layer protocols, with an emphasis on congestion control, including TCP over wireless, congestion sharing mechanisms, explicit and precise rate control, utility optimization-based approaches, and backpressure-based utility optimization. Network simulation software tools, security.

16B1NCI643
Computational Intelligence

Faculty: Satish Chandra

Problem solving by Uninformed and Unformed search strategies, Constraint satisfaction problems, Adversarial Search (games, alpha beta pruning), Knowledge based agents, PL, FOPL, Syntax and semantics), Inference in FOPL, Knowledge Representation, Planning with state space search, Uncertain knowledge and reasoning, Bayesian rule, Bayesian network, Inference, Learning(Inductive learning, decision tree, ensemble learning, explanation based learning, statistical learning model), Natural Language Processing

16B1NCI644
Cloud based Enterprise Applications

Faculty: Sandeep K Singh

Introduction to Java Enterprise Development, XML Programming in JAVA, JDBC, Basic JDBC Programming, JNDI, Using JNDI, Servlets, Programming Servlets, A Servlet-Based Search Engine, Server-Side Scripting, Creating Java Server Pages, A Java Server Page Online Store, Overview of Distributed Objects, Introduction to Java RMI , A Network File-Locking Server, Enterprise JavaBeans, Programming Enterprise JavaBeans, Deploying Enterprise JavaBeans, Enterprise Java Bean Business Rules Engine, Messaging and the Java Messaging Service, Programming with the Java Messaging Service, A JMS-Based Alarm System, Transactions, JTA, and JTS, Using Transactions with Enterprise JavaBeans, Architecture, Review, A Four-Tier Online Store, Mini JMS: A Java Messaging Service Provider etc. Introduction to Cloud Computing, Architectural design of Clouds, Virtualisation, Cloud Programming paradigms, Oracle Java Cloud Service - building, deploying, and managing Java EE applications

Course Outline – Even 2017
Audit Courses – VI Semester

16B19CI691
Advanced Java Workshop (1-0-2)

Faculty: Sandeep K. S., Raghu V., Kirti A., and Megha R.

Object Oriented Analysis and Design- Object Oriented Paradigm and Principles, Mapping of Principles in JAVA, OOAD Lifecycle, Object-oriented Analysis, Object Model, Object-oriented design-design principles, and Implementation strategies, Real Applications using OOAD, Multithreading, Collections and Generics, Networking, Database Programming, Distributed Objects, Java Security, Internalization, Native Methods, XML Processing in JAVA.

16B19CI692
Robotics Workshop (0-0-4)

Faculty: Hema N.

Robotics platform: Introduction to BASIC PROGRAMMING, Driver and ROBO 3D simulator. Machine control: Feedback control; Servomechanisms; Kinematic analysis- Hydraulic, pneumatic and electric drives – determination of HP of motor and gearing. Machine vision – ranging – laser – acoustic – magnetic, fiber optic and tactile sensors. Construction of manipulators – manipulator dynamics and force control – electronic and pneumatic manipulator control circuits – end effectors. Solution of inverse kinematics problem – multiple solution jacobian work envelop – hill climbing techniques. Mutiple robots – machine interface – robots in manufacturing and non- manufacturing applications.

16B19CI693
Multimedia Workshop (0-0-4)

Faculty: Suma Dawn

Introduction to Digital Graphics - Computer Graphics: Vector graphics and Raster images, Handling Digitally Designed Graphics; Creating Vector Graphics - Adobe Illustrator CS5: Working with Layers, Transformations, Adding Typography, Creating, Editing & Using Brushes, Applying Filters and Effects, Creating Illustrations; Adobe Photoshop CS5: Working with Layers, Channels and Paths, Understanding Resolution, File formats & sizes, Applying Filters and Effects, Making Color and Tonal Adjustments, Automating Tasks, Optimization and linking to web, Image Editing, Enhancement & Restoration, Visualization and Graphics Design; Adobe Flash CS5 – static and dynamic animation, working with Action script 3.0; Blender – creating simple 3D objects.

16B19CI694
Computer Games Workshop (0-0-4)

Faculty: Prashant Kaushik

This course discusses the games basic and fundamentals for the hobbits game making process. The game making process also involves evaluation of the game design assets and patterns for game making and prototyping. This course uses Unity3D game design tools and it’s plug-in for the mobile devices that include smart phones and tablets. this curse also evaluates the possibility of making virtual reality tours of various places and allowing people to use the VR devices for interacting with in the environment this also uses the Google's latest SDK daydream and Unity3d inbuilt SDK's.

16B19CI695
Competitive Programming Workshop (1-0-2)

Faculty: Manish K Thakur

Introduction to Competitive Programming: Input/Output, TLE, Test Case, Online/Onsite Programming Competitions, e.g., ACM ICPC, International Olympiad in Informatics (IOI), etc.; Online Judges and Program Repository: CodeChef, Codeforces, HackerRank, HackerEarth, SPOJ, etc.; Onsite Judges: PC2, Kattis, etc.; Reviewing Selected Solutions on Online Repository; Solving Selected Problems on Online Judges; Designing and Hosting Online/Onsite Programming Competitions; Developing Tools and Systems for Competitive Programming

16B19CI696
Parallel Programming Workshop (1-0-2)

Faculty: Chetna Dabas and Taj Alam

Introduction to thread programming and POSIX API and OPENMP. Multi-threading programs such as ATM server and matrix Multiplication. Synchronization with LOCKS and semaphores, Synchronization with message passing such as pipeline sort, N-Queens, thread priority and scheduling, sending, waiting and handling signals, load balancing, event synchronization, basics of MPI parallel programming. Case studies of threads in parallel programming: work-crew and boss workers. Case studies of threads in distributed programming: distributed sieve, dining philosophers and N-Queens.

16B19CI697
Distributed Database Workshop (1-0-2)

Faculty: Parmeet Kaur and Shikha Mehta

Introduction to Distributed databases, DDBMS Architecture, Distributed Query Processing and Optimization, Replication, SQL vs NOSQL and NewSQL, Distributed databases- Document oriented DBMS (MongoDB), Key-Value stores (Redis), Column Family DBMS (Cassandra), Graph based databases (Neo4j).

16B19CI698
Social Media Workshop (1-0-2)

Faculty: Anuja Arora and Neetu Sardana

In this course we explore the theoretical aspects and practical applications of social media tools- Pajek, Gephi, Net logo, iGraph, UCINet, NodeXL, NetworkX etc.. we also discuss tools based study for various applications such as facebook, twitter, LinkedIn, Pinterest, blogs, wikis and other social media websites. We also discuss the leading social media marketing tools and how they impact business. Facebook community building and advertising.

16B19CI699
Mobile Application Development Workshop (1-0-2)

Faculty: K. Rajalakshmi

Introduction to Mobile Operating Systems – Overview of Andorid OS - Andorid architecture – Eclipse and Android Installation – Programming Activities – Linking Activities using intents – Data Passing in Activities – Android User Interface Programming (Layout, Views) – Programming for Notification (Display, Creation) – Data Persistence – Content Providers – Messaging, Networking, Location based services– Developing Android Services – Publishing Android services.

16B19CI601
Hive Workshop (1-0-2)

Faculty: Satish Chandra and Archana Purwar

Introduction to Big data, Hadoop and Map Reduce paradigm , Review of SQL, limitation of SQL for big data, Introduction to hive, comparison of hive with other paradigms, installation of Hive, Introduction to HiveQL ,Creation of tables , execution of queries in hive, Sampling tables, Joining tables , Table storage and Partitioned tables , Various ways of accessing Hive, data analytics using hive.