E.G.S. PILLAY ENGINEERING COLLEGE
(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai
Accredited by NAAC with 'A' Grade | Accredited by NBA
NAGAPATTINAM – 611 002

B.E.Computer Science Engineering

Fourth Year – Seventh Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1702CS701	Cryptography and Network Security	3	0	0	3	40	60	100
1702CS702	Software Project Management	3	0	0	3	40	60	100
1702CS703	Big Data Analytics	3	0	0	3	40	60	100
1702CS704	Cloud Computing	3	0	0	3	40	60	100
	Elective V	3	0	0	3	40	60	100
	Elective VI(Open)	3	0	0	3	40	60	100
Laboratory Course								
1702CS751	Cloud Computing Lab	0	0	2	1	50	50	100
1702CS752	Network Security Lab	0	0	2	1	50	50	100
1704CS753	Software Development Lab (Mini Project III)	0	0	2	1	50	50	100
1704GE751	Life Skills: Competitive Exams Preparation	2	0	0	2	100	-	100
1704GE752	In-plant Training / Internship Presentation	0	0	0	1	100	-	100

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1702CS701	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Computer Networks
2. Basic knowledge of Number theory and finite field elements.

COURSE OBJECTIVES:

1. To know the principles and methods of conventional and advanced encryption algorithms.
2. To learn the techniques used for message authentication and confidentiality maintenance
3. To understand the network security tools and applications

UNIT I INTRODUCTION 09 Hours

Computer Security Concepts - OSI Security Architecture - Security Attacks – Services – Mechanisms - Model for Network Security - Classical Encryption Techniques - Symmetric Cipher Model - Substitution – Transposition Techniques - Basic Concepts in Number Theory and Finite Fields - Divisibility and Division Algorithm – Euclidean Algorithm - Modular Arithmetic.

UNIT II SYMMETRIC CIPHERS 09 Hours

Block Cipher Principles - Data Encryption Standard (DES) - DES Example - Strength of DES - Differential and Linear Cryptanalysis - Block Cipher Design Principles - Advanced Encryption Standard(AES) – Structure – Round Functions - Key Expansion - AES Example - Pseudorandom Number Generation and Stream Ciphers - RC5

UNIT III ASYMMETRIC CIPHERS & KEY MANAGEMENT 09 Hours

Prime Numbers - Fermat's and Euler's Theorems - Testing for Primality - Chinese reminder theorem Discrete Logarithms - Public-Key Cryptography and RSA - Diffie-Hellman Key Exchange - Key Management and Distribution - Symmetric Key Distribution Using Asymmetric Encryption - Distribution of Public Keys - X.509 Certificates - Public Key Infrastructure.

UNIT IV CRYPTOGRAPHIC DATA INTEGRITY ALGORITHMS 09 Hours

Cryptographic Hash Functions - Applications - Two Simple Hash Functions - Requirements and Security Hash Functions based on Cipher Block Chaining - Secure Hash Algorithm (SHA) - SHA-3 – Message Authentication Codes - Requirements – Functions - Security of MACs - MACs based on Hash Functions: HMAC – Digital Signatures - Digital Signature Standard (DSS) – Kerberos-Electronic Commerce Security

UNIT V NETWORK AND INTERNET SECURITY 09 Hours

Transport Level Security - Web Security Issues - Secure Sockets Layer (SSL) - Transport Layer Security (TLS)- HTTPS - Secure Shell (SSH) - Electronic Mail Security - Pretty Good Privacy (PGP) - S/MIME - IP Security – Firewalls- Viruses and worms

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Digital Watermarking and Steganography
2. International Data Encryption Algorithm (IDEA)

REFERENCES:

1. William Stallings, Cryptography and Network security Principles and Practices, 6th edition, Pearson Education, 2014
2. William Stallings, Network security essentials – application and standards, Prentice Hall of India , 2010
3. Charles P.Fleeger, Shari Lawrence P.Fleeger, Security in computing, Prentice Hall of India, 2009
4. https://onlinecourses.nptel.ac.in/noc18_cs07/preview

1702CS702	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

PREREQUISITE:

Software Engineering

COURSE OBJECTIVES:

1. To provide a strong foundation on the concept of software project development
2. To learn the concepts on project management and evaluation.
3. To understand the principles of management and team organization.

UNIT I PROJECT EVALUATION AND PROJECT LIFE CYCLE 09 Hours

Understanding software projects – Project management vs. product management – stages of project management – Software project life cycle - Managerial issues.

UNIT II ACTIVITY PLANNING AND RISK MANAGEMENT 09 Hours

Project initiation – Identifying project – Developing project character – Identifying stack holders – Requirement analysis – Gathering requirements – Requirements types – Project scope planning – Resource breakdown structure (RBS) – Manpower planning – Quality planning – Time and Cost estimates – Risk management planning – Procurements for the project.

UNIT III COST ESTIMATION TECHNIQUES 09 Hours

Software effort estimation techniques: KLOC/SLOC estimation, expert opinion, top-down and bottom-up approach, use-case point estimates, object point estimates, Delphi technique – Project test plan – Software quality assurance (SQA) – Software quality control (SQC) – cost of quality – Software quality Metrics – SEI-CMMi model

UNIT IV RISK MANAGEMENT AND CONTROL 09 Hours

Understanding Project risk management process – risk management planning – identification of risks – risk analysis – risk-response planning – Monitoring the risks – Role of project manager – Leadership styles – recruitment process – team development stages – Conflict management in Project environment – Hiring and firing issues in software project management – Communication process

UNIT V ADVANCED TOPICS 09 Hours

Project scheduling – Activity diagrams – Network diagrams – PERT & CPM for Schedule development – Schedule compression technique – Critical chain method – Software project scheduling tools – Program - Project-Program-Portfolio relationships - Project portfolio –Project Management Careers.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1.Import of the internet on project Management

2.Classification of Software Metrics

REFERENCES:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.
2. Robert K. Wysocki “Effective Software Project Management” – Wiley Publication,2011.
3. Joel Henry,”Software Project Management: A real world guide to success”, Pearson,2011
4. Sanjay Mohapatra, “Software Project Management”, Cengage Learning, 2011.
5. http://nptel.ac.in/courses/106101061/

1702CS703	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

PREREQUISITE:

Database Management System, Data Mining

COURSE OBJECTIVES:

1. Be exposed to big data
2. Learn the different ways of Data Analysis
3. Learn the mining and clustering
4. Be familiar with the data streams and visualization

UNIT I INTRODUCTION TO BIG DATA 9 Hours

Introduction to Big Data Platform – Challenges of conventional systems – Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting – Modern data analytic tools, Stastical concepts: Sampling distributions, resampling, statistical inference, prediction error.

UNIT II DATA ANALYSIS 9 Hours

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics – Rule induction – Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT III MINING DATA STREAMS 9 Hours

Introduction to Streams Concepts – Stream data model and architecture – Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window – Real time Analytics Platform(RTAP) applications – case studies – real time sentiment analysis, stock market predictions.

UNIT IV FREQUENT ITEMSETS AND CLUSTERING 9 Hours

Mining Frequent itemsets – Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

UNIT V FRAMEWORKS AND VISUALIZATION 9 Hours

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases – S3 – Hadoop Distributed file systems – Visualizations – Visual data analysis techniques, interaction techniques; Systems and applications

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Analyzing big data with twitter
2. Big data for Ecommerce and Big data for blogs

REFERENCES:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007
2. AnandRajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
3. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advancedanalystics, John Wiley & sons, 2012.
4. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
5. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs33/

1702CS704	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

PREREQUISITE:

Computer Networks, Distributed Systems

COURSE OBJECTIVES:

1. To understand the differences between traditional deployment and cloud computing
2. To determine whether existing applications to the cloud makes technical and business sense
3. To learn how to build a transactional web application for the cloud or migrate one to it

UNIT I CLOUD ARCHITECTURE BASICS 9 Hours

The Cloud –Hype cycle-metaphorical interpretation-cloud architecture standards and interoperability- Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public, private clouds community cloud, role of virtualization in enabling the cloud.

UNIT II END TO END DESIGN 9 Hours

Requirement analysis: strategic alignment and architecture development cycle-strategic impact-Risk impact-financial impact-Business criteria-technical criteria-cloud opportunities –evaluation criteria and weight-End to end design-content delivery networks-capacity planning-security architecture and design

UNIT III CLOUD APPLICATION ARCHITECTURES 9 Hours

Development environments for service development; Amazon, Azure, Google App-cloud platform in industry

UNIT IV HOW TO MOVE APPLICATION INTO THE CLOUD 9 Hours

Web Application Design- Machine Image Design-privacy design –Database management

UNIT V SPECIALIZED CLOUD ARCHITECTURE 9 Hours

Workload distribution architecture-Dynamic scalability-Cloud bursting-hypervisor clustering-service quality metrics &SLA.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Data Analytics
2. Cloud Cryptography

REFERENCES:

1. John Rhoton ,Cloud Computing Explained: Handbook for Enterprise Implementation 2013 edition, 2013, recursive press
2. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi,Mastering Cloud Computing: Foundations and Applications Programming,MorganKaufmann,,Elsevier publication, 2013
3. Thomas Erl, ZaighamMahmood, and Ricardo Puttini,Cloud Computing Concepts, Technology & Architecture, PRENTICE HALL,2013
4. Reese, G (2009). Cloud Application Architectures: Building Applications and Infrastructure in the Cloud. Sebastopol, CA: O'Reilly Media, Inc. (2009).
5. https://nptel.ac.in/courses/106/105/106105167/

1703CS001	SERVICE ORIENTED ARCHITECTURE	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Basic knowledge of Internet Programming
2. Distributed Systems

COURSE OBJECTIVES:

1. Learn XML fundamentals.
2. Be exposed to build applications based on XML.
3. Understand the key principles behind SOA

UNIT I INTRODUCTION TO XML **09 Hours**

XML document structure – Well formed and valid documents – Namespaces – DTD –X-Files.

UNIT II BUILDING XML- BASED APPLICATIONS **09 Hours**

XML Schema - XML Transformation and XSL – XSL Formatting – Modeling Databases in XML.

UNIT III SERVICE ORIENTED ARCHITECTURE **09 Hours**

Characteristics of SOA, Comparing SOA with Client-Server and Distributed architectures – Benefits of SOA -- Principles of Service orientation – Service layers.

UNIT IV WEB SERVICES **09 Hours**

Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI- Orchestration – Choreography –WS Transactions.

UNIT V BUILDING SOA-BASED APPLICATIONS **09 Hours**

Service Oriented Analysis and Design – Service Modeling – Design standards and guidelines -- Composition – WS-BPEL – WS-Coordination – WS-Policy – WS-Security

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Web page designing using xml concepts
2. Advanced WS security policies

REFERENCES:

1. Peter S. Pacheco, “An Introduction to Parallel Programming”, Morgan-Kauffman/Elsevier, 2011.
2. Darryl Gove, “Multicore Application Programming for Windows, Linux, and Oracle Solaris”, Pearson, 2011
3.John L. Hennessey and David A. Patterson, “Computer Architecture – A Quantitative Approach”, Morgan Kaufmann / Elsevier, 5th edition, 2012.
4.Richard Y. Kain, “Advanced Computer Architecture a Systems Design Approach”, Prentice Hall, 2011
5, Peter S. Pacheco, “An Introduction to Parallel Programming”, Morgan-Kauffman/Elsevier, 2011.
6.https://www.coursera.org/learn/service-oriented-architecture

1702CS751	CLOUD COMPUTING LAB	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

1. Be exposed to tool kits for setting up cloud environment
2. Learn to use Hadoop
3. Be familiar with developing applications on cloud.
4.

LIST OF EXPERIMENTS:

1. Study the installation procedure of openstack or opennebula to set up a private cloud
2. Find procedure to run the virtual machine of different configurations. Check how many virtual machines can be utilized at particular time
3. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
4. Install a C compiler in the virtual machine and execute a sample program.
5. Show the virtual machine migration based on the certain condition from one node to the other.
6. Find procedure to install storage controller and interact with it.
7. Find procedure to set up the one node Hadoop cluster.
8. Mount the one node Hadoop cluster using FUSE.
9. Write a program to use the API's of Hadoop to interact with it.
10. Write a wordcount program to demonstrate the use of Map and Reduce tasks

Total: 45 Hours

ADDITIONAL EXPERIMENTS:

1. Launch and configure a virtual machine in AWS cloud
2. Install a public webserver in the VM launched in AWS and access the webpage from any anywhere

REFERENCES:

1. John Rhoton ,Cloud Computing Explained: Handbook for Enterprise Implementation 2013 edition, 2013, recursive press.
2. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi,Mastering Cloud Computing: Foundations and Applications Programming,MorganKaufmann,,Elsevier publication, 2013
3. Thomas Erl, ZaighamMahmood, and Ricardo Puttini,Cloud Computing Concepts, Technology & Architecture, PRENTICE HALL,2013
4. Reese, G (2009). Cloud Application Architectures: Building Applications and Infrastructure in the Cloud. Sebastopol, CA: O'Reilly Media, Inc. (2009).

1702CS752	NETWORK SECURITY LAB	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

1. To impart practical knowledge on network security concepts and mechanisms.
2. Experiment and analyze important cryptographic algorithms
3. Experiment security algorithms with efficiently implement key exchange algorithm
4. Learn to use network security tools like GnuPG, KF sensor, Snort.

LIST OF EXPERIMENTS:

1. Implement the following SUBSTITUTION TECHNIQUES:
   a) Caesar Cipher
   b) Playfair Cipher
   c) Hill Cipher
   d) Vigenere Cipher
2. Implement the following TRANSPOSITION TECHNIQUES:
   A) Rail fence – row & Column Transformation
3. Implement the following algorithms
   a) DES
   b) RSA Algorithm
   c) Diffiee-Hellman
   d) MD5
   e) SHA-1
4. Implement the Signature Scheme – Digital Signature Standard
5. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG)
6. Setup a honey pot and monitor the honeypot on network (KF Sensor)
7. Installation of rootkits and study about the variety of options
8. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)
9. Case Study on Snort Installation and Setup.
10. Case Study on Wireshark Installation and Setup.

Total: 30 Hours

ADDITIONAL EXPERIMENTS:

1. Configure SSH (Secure Shell) and send/receive a file on this connection to verify the correctness of this system using the configured parameters.
2. Perform Simple experiments using the sniffer mode, the packet logger mode, and the Network Intrusion Detection mode of Snort.

COURSE OUTCOMES:

After completion of the course, Student will be able to

1. Implement the cipher techniques.
2. Gain practical experience of designing and implementing network security algorithms and protocols
3. Use different open source tools for network security and analysis

REFERENCES:

1. "Cryptography and Network Security" by William Stallings 6th Edition, PearsonEducation.
2. http://www.snort.org/docs/snort_manual/
3. http://ussrback.com/docs/papers/IDS/snort_rules.htm.html
4. http://www.wireshark.org/download.html

1704CS753	SOFTWARE DEVELOPMENT LABORATORY (MINI PROJECT III)	L	T	P	C
		0	0	2	1

PREREQUISITE :

1. Object Oriented Analysis & Design

COURSE OBJECTIVES:

1. To highlight the importance of Software Development and design and its limitations
2. To show how we apply the process of software development.
3. To provide the necessary knowledge and skills in using Software Development Tools.

LIST OF EXPERIMENTS:

1. Identification of Use cases for each application system and SRS preparation.
2. Formulate Domain Analysis, Elaboration through Modeling and Implementation through state of the art technology available.
3. Coding/Customizing/Wrapping for components/subsystems
4. Testing – Scenario testing and test case preparation for each components/subsystems
5. Builds the spirit of team work in design process.
6. Integration of subsystems and Testing
7. Become proficient in the programming languages

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS :

1. More Project Development and Testing.

COURSE OUTCOMES:

After completion of the course, Student will be able to

CO1 Design and implement projects using Software Components
CO2 Recognize the role and function of each Development model in software System.
CO3 Apply appropriate design patterns.
CO4 Create code from design
CO5 Compare and contrast various testing techniques

REFERENCES:

1.https://www.knowgravity.com
2.http://www.win.tue.nl/
3. https://www.microconsult.de

1704CS754	IMPLANT / INTERNSHIP TRAINING PRESENTATION	L	T	P	C
		0	0	0	1

In order to provide the experiential learning to the students, the students undergo in-plant training or internship during summer / winter vacation between III and VII semesters. A presentation based on in-plant training / internship shall be made in this semester and suitable credit may be awarded.

Internal Assessment Only	
Test	40
Presentation / Quiz / Group Discussion	40
Report	20

1704GE751	LIFE SKILLS: COMPETITIVE EXAM PREPARATION	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

1. Study the concepts of data structures, algorithms and computer architecture.
2. Study the process and implementation of Operating systems and design of compilers.
3. Familiar with the database ,network and Artificial Intelligence concepts

Data Structures: Recursion. Arrays, Stacks, Queues, Linked lists, Trees, Graphs

Algorithms: Searching – Sorting - Asymptotic worst case time and space complexity – Greedy – Divide & Conquer – Dynamic Programming

Computer Organization: Digital logic,Machine instructions - Addressing modes - Hazards – Pipelining - Memory hierarchy - I/O interface

Operating System: Processes – Threads - Inter-process communication - Concurrency and synchronization – Deadlock - CPU scheduling - Memory management and virtual memory - File systems

Databases: ER-model - Relational model: Relational algebra, Tuple Calculus - SQL - Integrity constraints -Normal forms -Transactions and concurrency control

Computer Networks: Layering – Categories – Topology - Flow and Error control techniques – Switching - IPv4/IPv6 - Routing - TCP – UDP - Application layer protocols – Bluetooth - Wi-Fi - Network security – Firewalls - Digital signatures and certificates.

Compiler Design: Theory of Computation - Lexical analysis, parsing, syntax directed translation - Runtime environments - code generation

Artificial Intelligence: Knowledge representation, Knowledge representation using Predicate logic, Use of predicate calculus, Planning with state-space search – partial-order planning, Backward chaining, Forward chaining,

Total: 30 Hours

ASSESSMENT PATTERN :

Marks (Continuous Assessment Only)
Test I 25
Test II 25
Final Examination 50
Total Marks 100

REFERENCES:

1. M.A.Weiss, Data Structures and Algorithm Analysis in C, Pearson Education Asia, 2015.
2. Carl Hamacher, ZvonkoVranesic and SafwatZaky, Computer Organization, McGraw-Hill, Third Reprint 2015.
3. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne,"Operating System Principles", John Wiley & Sons (Asia) Pvt. Ltd, Ninth Edition, 2013.
4. Alfred V. Aho, Ravi Sethi and Jeffrey D. Ullman Compilers: Principles, Techniques and Tools , 2nd Edition, Pearson, 2012.
5. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts , McGraw -Hill, 2015.
6. BehrouzA.Forouzan, Data Communication and Networking, 5th Edition, Tata McGraw-Hill, 2014.
7. Elaine Rich And Kevin Knight Artificial Intelligence, 2nd Edition, Tata Mcgraw-Hill