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.TECH INFORMATION TECHNOLOGY

Fourth Year – Seventh Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1701MGX01	Professional Ethics	3	0	0	3	40	60	100
1702IT701	Data Analytics	3	2	0	4	40	60	100
1702IT702	Security in Computing	3	0	2	4	50	50	100
1702IT703	Cloud Infrastructure and Computing	3	2	0	4	40	60	100
1703IT015	Elective-III	3	0	0	3	40	60	100
	Elective – IV (Open)	3	0	0	3	40	60	100
Laboratory Course								
1704IT751	Software Development (Mini Project III)	0	0	2	1	50	50	100
1704GE751	Life Skills: Competitive Exam Preparation	2	0	0	2	100	-	100
1704IT752	In Plant / Internship Training Presentation	0	0	0	1	100	0	100

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

1701MGX01	PROFESSIONAL ETHICS	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Basic understanding of business management
2. Basic understanding of human values

COURSE OBJECTIVES:

1. To provide basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues
2. To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards, Exposure to Safety and Risk, Risk Benefit Analysis
3. To have an idea about the Collegiality and Loyalty, Collective Bargaining, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights
4. To have an adequate knowledge about MNC's, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.
5. To use the engineering principles to update and maintain the technical skills.

UNIT I ENGINEERING ETHICS **9 Hours**

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION **9 Hours**

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study.

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY **9 Hours**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Case Studies on Chernobyl, Bhopal MIC and Sterlite copper.

UNIT IV RESPONSIBILITIES AND RIGHTS **9 Hours**

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES **9 Hours**

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Case study on Hiroshima and Nagasaki

REFERENCES:

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi 2004
5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)
6. Nptel link: https://nptel.ac.in/courses/109/106/109106117/

1702IT701	DATA ANALYTICS	L	T	P	C
		3	2	0	4

PREREQUISITE:

1. Data warehouse and Data mining

COURSE OBJECTIVES:

1. Deploying the Data Analytics lifecycle to address big data analytics projects.
2. Reframing a business challenge as an analytics challenge
3. Applying appropriate analytic techniques and tools to analyze big data.
4. Selecting appropriate data visualizations to clearly communicate analytic insights to business sponsors and analytic audiences
5. Using tools such as: R and R-Studio, Map Reduce /Hadoop in database analytics.

UNIT I INTRODUCTION **12 Hours**

Introduction to Data Science – Data Classification – Data Analytics - Big data overview – characteristics of Big data – the practice of analytics – the role and required skills of data scientist.

UNIT II DATA ANALYTICS LIFECYCLE **12 Hours**

Discovery – Data preparation – model planning and building – communicating results – operation alizing a data analytics project.

UNIT III DATA ANALYTICS METHOD USING R **12 Hours**

Introduction to R - Using basic R commands to analyze data – statistical measures and visualization to understand data – Practical: RStudio basic commands.

UNIT IV MAP REDUCE AND ITS FRAMEWORK **12 Hours**

Introduction to Map Reduce – Hadoop ecosystems – SQL OLAP extensions, windows functions, user defined functions and aggregates – MADlib.

UNIT V ADVANCED DATA ANALYTICS **12 Hours**

Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Deep Learning, Augmented Learning

REFERENCES:

1. ICTACT “Data science and big data analytics “, EMC2 edition 2016
2. Noreen Burlingame, Little Book of Big Data‖ Kindle Edition.2015
3. Tom White, Hadoop the definitive Guide‖, O‘Reilly Media yahoo Press, 2nd Edition,2012
4. Alex Holmas, Hadoop in Practice‖, Manning Publications, 2012.
5. https://www.openstack.org/
6. http://nptel.ac.in

1702IT702	SECURITY IN COMPUTING	L	T	P	C
		3	0	2	4

PREREQUISITE:

Computer Networks, Java Programming

COURSE OBJECTIVES:

1. Understand the concepts of public key encryption and number theory
2. Understand authentication and hash functions.
3. Know the network security tools and applications.
4. Understand the system level security used.

UNIT I INTRODUCTION **9 Hours**

Motivating examples– Basic concepts: confidentiality, integrity, availability, security policies, security mechanisms, assurance –Basic Cryptography: Historical background, –Elementary Ciphers (Substitution, Transposition and their Properties) –Caesar Cipher– Data Encryption Standard – Block Cipher Design Principles and Modes of Operation – Case study: AES.

UNIT II PUBLIC KEY CRYPTOGRAPHY **9 Hours**

Euclidean algorithm –Euler Theorem– Fermat Theorem– Totent functions– multiplicative and additive inverse – Selection of public and private keys–Case Study: Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography – Case Study: RSA.

UNIT III AUTHENTICATION AND HASH FUNCTION **9 Hours**

Security Handshake pitfalls–Online vs. offline password guessing–Reflection attacks Per-session keys and authentication tickets–Key distribution centers and certificate authorities Authentication requirements – Authentication functions – Message Authentication Codes– Hash Functions – Case Study: MD5, HMAC.

UNIT IV NETWORK SECURITY AND FIREWALLS **9 Hours**

Public Key infrastructures– IPSec - IKE– SSL/TLS - Authentication Application: X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security – Kerberos - Packet filters– Application level gateways– Encrypted tunnels.

UNIT V HACKING **9 Hours**

Introduction to Hacking – Hacking Process – Foot printing – System Hacking – Trojan Horses – Ethical Hacking – Attacks and Countermeasures.

LIST OF EXPERIMENTS: **15 Hours**

1. Implement the following Substitution & Transposition Techniques concepts
2. Implement the following algorithms a) DES b) RSA Algorithm c) Diffie-Hellman d) MD5 e) SHA-1
3. 3 Implement the Signature Scheme - Digital Signature Standard
4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
5. Setup a honey pot and monitor the Honeypot on network (KF Sensor)
6. Installation of Rootkits and study about the variety of options
7. Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler)
8. Demonstrate intrusion detection system (IDS) using any tool (snort or any other s/w)
9. Apply different hacking techniques and counter measures to solve various problems

SOFTWARE REQUIREMENTS: Java Compiler, GnuPG, KF Sensor or Equivalent, Snort, Net Stumbler or Equivalent

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Cyber Forensics, Security Management issues

REFERENCES:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Pearson Education, Third Edition, 2016
2. Charlie Kaufman, Radia Perlman, and Mike Speciner, " Network Security: PRIVATE Communication in a PUBLIC World", Prentice Hall, ISBN 0-13-046019-2, 2017
3. Behrouz A. Foruzan, "Cryptography and Network Security", Tata McGraw-Hill, 2013

4. Bruce Schneier, “Applied Cryptography”, John Wiley & Sons Inc, 2013.
5. Charles B. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Third Edition, Pearson Education, 2012
6. Wade Trappe and Lawrence C. Washington , “ Introduction to Cryptography withcoding theory” , Pearson Education, 2012.
7. Thomas Calabrese, “Information Security Intelligence : Cryptographic Principles andApplications”, Thomson Delmar Learning,2012.
8. http://nptel.ac.in//

1703IT703	CLOUD INFRASTRUCTURE AND COMPUTING	L	T	P	C
		3	2	0	4

PREREQUISITE:

1. Distributed Computing
2. Data Mining and Data Warehousing

COURSE OBJECTIVES:

1. Introduce the broad perceptive of cloud architecture and model
2. Understand the concept of Virtualization
3. Be familiar with the lead players in cloud.
4. Apply different cloud programming mode as per need
5. Understand the design of cloud Services.

UNIT I CLOUD ARCHITECTURE AND GRID SERVICE MODEL 9 Hours

Technologies for Network-Based System – System Models for Distributed and Cloud Computing Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS)– OGSA architecture.

UNIT II VIRTUALIZATION 9 Hours

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization- Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O devices - Virtualization for Data-center Automation.

UNIT III CLOUD INFRASTRUCTURE 9 Hours

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture- Development – Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT IV PROGRAMMING MODEL 9 Hours

Globus Toolkit (GT4) Architecture – MapReduce, – Hadoop Library from Apache - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula. OpenStack.

UNIT V SECURITY IN THE CLOUD 9 Hours

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security — Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

LIST OF EXPERIMENTS: 15 Hours

1. Introduction to cloud computing.
2. Creating a Warehouse Application in SalesForce.com.
3. Implementation of Para-Virtualization using VM Ware‘s Workstation/ Guest O.S.
4. Installation and Configuration of Hadoop.
5. Create an application (Ex: Word Count) using Hadoop Map/Reduce.
6. Securing Servers in Cloud.
7. Case Study: PAAS(Facebook, Google App Engine), Amazon Web Services.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Cyber Forensics, Security Management issues

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2016.
2. John W.Rittinghouse and James F.Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2012.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2013.
4. Kumar Saurabh, “Cloud Computing – insights into New-Era Infrastructure”, Wiley India, 2011.
5. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud” O'Reilly, 2015
6. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, “Grid and Cloud Computing – A Business Perspective on Technology and Applications”, Springer, 2015

7. Rajkumar Buyya, Christian Vecchiola, S.TamaraiSelvi, 'Mastering Cloud Computing", TMGH, 2014.
8. http://nptel.ac.in//

1703IT015	INFORMATION MANAGEMENT	L	T	P	C
		3	0	0	3

PREREQUISITE:

Distributed Computing, Cloud Computing

COURSE OBJECTIVES:

1. To expose students with the basics of managing the information
2. To explore the various aspects of database design and modeling.
3. To examine the basic issues in information governance and information integration
4. To understand the overview of information architecture

Unit I DATABASE MODELLING, MANAGEMENT AND DEVELOPMENT 9 Hours

Database design and modeling - Business Rules and Relationship; Java database Connectivity (JDBC), Database connection Manager, Stored Procedures. Trends in Big Data systems including NoSQL - Hadoop HDFS, MapReduce, Hive, and enhancements.

Unit II DATA SECURITY AND PRIVACY 9 Hours

Program Security, Malicious code and controls against threats; OS level protection; Security – Firewalls, Network Security Intrusion detection systems. Data Privacy principles. Data Privacy Laws and compliance.

Unit III INFORMATION GOVERNANCE 9 Hours

Master Data Management (MDM) – Overview, Need for MDM, Privacy, regulatory requirements and compliance. Data Governance – Synchronization and data quality management.

Unit IV INFORMATION ARCHITECTURE 9 Hours

Principles of Information architecture and framework, Organizing information, Navigation systems and Labeling systems, Conceptual design, Granularity of Content.

Unit V INFORMATION LIFECYCLE MANAGEMENT 9 Hours

Data retention policies; Confidential and Sensitive data handling, lifecycle management costs. Archive data using Hadoop; Testing and delivering big data applications for performance and functionality; Challenges with data administration.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

Big Data, Cyber Physical Systems

REFERENCES:

1. Alex Berson, Larry Dubov Master Data Management and Data Governance, 2/E,Tata McGraw Hill, 2015
2. Security in Computing, 4/E, Charles P. Pfleeger, Shari Lawrence Pfleeger, Prentice Hall; 2013
3. Information Architecture for the World Wide Web; Peter Morville, Louis Rosenfeld ; O'Reilly Media;2011
4. Jeffrey A. Hoffer, HeikkiTopi, V Ramesh - Modern Database Management, 10 Edition, Pearson, 2012
5. http://nosql-database.org/ Next Gen databases that are distributed, open source and scalable.
6. http://ibm.com/big-data - Four dimensions of big data and other ebooks on Big Data Analytics
7. Inside Cyber Warfare: Mapping the Cyber Underworld- Jeffrey Carr, O'Reilly Media; Second Edition 2011
8. http://nptel.ac.in

1704IT751	SOFTWARE DEVELOPMENT (MINI PROJECT III)	L	T	P	C
		0	0	2	1

PREREQUISITE :

1. CASE Tools
2. Application Development (Web and Mobile Apps)
3. Software Engineering and Project Management

COURSE OBJECTIVES:

1. To develop knowledge to formulate a real world problem and project's goals.
2. To identify the various tasks of the project to determine standard procedures.
3. To identify and learn new tools, algorithms and techniques.
4. To understand the various procedures for validation of the product and analysis the cost effectiveness.
5. To understand the guideline to Prepare report for oral demonstrations.

TO DEVELOP A MINI-PROJECT USING FOLLOWING PROBLEM STATEMENTS AND PROJECT SELECTION BASED ON REAL TIME AND SOCIAL ISSUES

1. Automation Anywhere
2. Inventory Control
3. Course Registration
4. Online Mentoring
5. Web Crawling and App development
6. Data Centre and Virtualization
7. Cyber Security in Information and Communication Engineering
8. Online Token Passing Systems
9. Course Assessment and Attainment Processing Systems
10. MOOC and Online Learning platforms

Not limited too.

TOTAL:45 HOURS

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 and network 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: 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 - Intermediate code generation

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, Zvonko Vranesic and Safwat Zaky, 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. Behrouz A.Forouzan, Data Communication and Networking, 5th Edition, Tata McGraw-Hill, 2014.

1704IT754 IN PLANT / INTERNSHIP TRAINING PRESENTATION L T P C

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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