DATA SECURITY
(DCS701)

Objective: To understand and apply the models of Information Security.	
Unit	**Topic**
I	Data Privacy Ethics and Security Privacy – Reidentification of Anonymous People – Why Big Data Privacy is self-regulating? – Ethics – Ownership – Ethical Guidelines – Big Data Security – Organizational Security.
II	Security, Compliance, Auditing, and Protection Steps to secure big data – Classifying Data – Protecting – Big Data Compliance – Intellectual Property Challenge – Research Questions in Cloud Security – Open Problems.
III	Hadoop Security Design Kerberos – Default Hadoop Model without security - Hadoop Kerberos Security Implementation & Configuration.
IV	Hadoop Ecosystem Security Configuring Kerberos for Hadoop ecosystem components – Pig, Hive, Oozie, Flume, HBase, Sqoop.
V	Data Security & Event Logging Integrating Hadoop with Enterprise Security Systems - Securing Sensitive Data in Hadoop – SIEM system – Setting up audit logging in hadoop cluster.

Text Book (s):

1. Mark Van Rijmenam, “Think Bigger: Developing a Successful Big Data Strategy for Your Business”, Amazon, 1 edition

2. Frank Ohlhorst John Wiley & Sons, “Big Data Analytics: Turning Big Data into Big Money”, John Wiley & Sons.

3. Sherif Sakr, “Large Scale and Big Data: Processing and Management”, CRC Press.

4. Ben Spivey, Joey Echeverria, “Hadoop Security Protecting Your Big Data Problem”, O’Reilly

5. Peter Ryan, Steve Schneider, Michael Goldsmith, Gavin Lowe, Bill Roscoe: Modelling & Analysis of Security Protocols, Addison Wesley.

6. Stephen W. Mancini: Automating Security Protocol Analysis, Storming Media

Internet of Things
(DCS702)

Objective: The objective of this course is to impart necessary and practical knowledge of components of Internet of Things and develop skills required to build real-life IoT based projects.	
Unit	**Topic**
I	Introduction to IoT: Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service (XaaS), Role of Cloud in IoT, Security aspects in IoT.
II	Elements of IoT Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces.
III	Software Components- Programming API's (using Python/Node.js/Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.
IV	IoT Application Development: Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.
V	IoT Case Studies: IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation

Text Book (s):

1. Vijay Madisetti, Arshdeep Bahga, Internet of Things, "A Hands-on Approach", University Press
2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A
practical Approach", ETI Labs
3. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
4. Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi
5. Adrian McEwen, "Designing the Internet of Things", Wiley
6. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill

SPEECH AND NATURAL LANGUAGE PROCESSING
(DCS703)

Objective: To provide the knowledge about language and concept learning.	
Unit	**Topic**
I	Introduction to Natural Language Understanding, Language as Knowledge Base Process, Basic Linguistics, Computers & Natural Language Understanding.
II	Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top-Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.
III	Transition Network Grammer, Grammer and Logic Programming, Semantic Interpretation-Semantic and Logical Form, Linking Syntax and Scemantics, Ambiguity Resolution
IV	Introduction to Semantic Grammer, Template Matching, Semantically Driven Parsing Techniques Context and World Knowledge, Knowledge Representation and Reasoning
V	Local Discourse Context and Reference, Discourse Structure and Understanding Using World Knowledge, Language Learning and Concept Learning

Text Book (s):

1. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal “NLP: A Paninian Perspective”, PHI.
2. James Allen “Natural Language Understanding” Pearson Education.
3. Rich & Knight, Artificial Intelligence, TMH.
4. Dan W. Patterson, Artificial Intelligence: A Modern Approach, Pearson Education.
5. Russell Norwig, Artificial Intelligence: A Modern approach, Pearson Education.

Industrial Training
(DCS751)

Contents: Four weeks of work at industry site
Supervised by an expert at the industry

Students have to maintain a written record of the assignments, progress and accomplishments. They have to submit a report at the end of this training. An oral presentation on their experiences and the knowledge gained during their work.

Mode of Evaluation

Oral viva - voce (50%)
Report (50%)

Mini Project
(DCS752)

The object of *Project Work I* is to enable the student to take up investigative study in the broad field of *Computer Science & Engineering*, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work. The assignment to normally include:

1) Survey and study of published literature on the assigned topic;
2) Working out a preliminary Approach to the Problem relating to the assigned topic;
3) Conducting preliminary
4) Analysis/Modeling/Simulation/Experiment/Design/Feasibility;
5) Preparing a Written Report on the Study conducted for presentation to the
6) Department;
7) Final Seminar, as oral Presentation before a Departmental Committee.

Major Project Work & Dissertation
(DCS851)

The object of *Project Work II & Dissertation* is to enable the student to extend further the investigative study taken up under *EC P1*, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

- In depth study of the topic assigned in the light of the Report prepared under *EC P1;*
- Review and finalization of the Approach to the Problem relating to the assigned topic;

- Preparing an *Action Plan* for conducting the investigation, including team work;
- Detailed Analysis/Modeling/Simulation/Design/Problem Solving/Experiment as Needed;
- Final development of product/process, testing, results, conclusions and future Directions;
- Preparing a paper for Conference presentation/Publication in Journals, if possible;
- Preparing a Dissertation in the standard format for being evaluated by the Department;
- Final Seminar Presentation before a Departmental Committee.