

# 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 (CSE, EEE, MECH, IT, CIVIL, ECE)

NAGAPATTINAM – 611 002



## B.TECH. INFORMATION TECHNOLOGY

### Full Time Curriculum and Syllabus

#### Fourth Year – Eighth Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
<b>Theory Course</b>								
	Professional Elective 7	3	0	0	3	40	60	100
	Professional Elective 8	3	0	0	3	40	60	100
	Professional Elective 9	3	0	0	3	40	60	100
<b>Laboratory Course</b>								
1704IT851	Project Work	0	0	18	9	50	50	100
Total		9	0	18	18	170	230	400

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

**1704IT851**

**PROJECT WORK**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>18</b>	<b>9</b>

**Course Objectives:**

The student should be made to:

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.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

**TOTAL: 180 Hours**

1703IT019	CYBER FORENSICS		L	T	P	C	
			3	0	0	3	
<b>AIM:</b> This course will understand and learn various cyber forensics and security techniques in real time environment							
<b>COURSE OBJECTIVES:</b>							
<ol style="list-style-type: none"> <li>1. Learn the security issues network layer and transport layer</li> <li>2. Be exposed to security issues of the application layer</li> <li>3. Learn computer forensics</li> <li>4. Be familiar with forensics tools</li> <li>5. Learn to analyze and validate forensics data</li> </ol>							
<b>UNIT I</b>	<b>NETWORK LAYER AND TRANSPORT LAYER SECURITY</b>					<b>9 Hours</b>	
Network layer security: IPSec Protocol – IP Authentication Header – IP ESP –Key Management Protocol for IPSec– Transport layer Security: SSL protocol–Cryptographic Computations – TLS Protocol.							
<b>UNIT II</b>	<b>E-MAIL SECURITY &amp; FIREWALLS</b>					<b>9 Hours</b>	
PGP– S/MIME– Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology–Types of Firewalls –Firewall designs – SET for E-Commerce Transactions							
<b>UNIT III</b>	<b>COMPUTER FORENSICS</b>					<b>9 Hours</b>	
Traditional Computer Crimes–Problems associated with Computer Crime–Identity Theft & Identity Fraud– Types of CF techniques –Incident and incident response methodology – Forensic duplication and investigation– Preparation for IR: Creating response tool kit and IR team. – Forensics Technology and Systems – Understanding Computer Investigation – Data Acquisition.							
<b>UNIT IV</b>	<b>EVIDENCE COLLECTION AND FORENSICS TOOLS</b>					<b>9 Hours</b>	
Processing Crime and Incident Scenes – Working with Windows and DOS Systems– Current Computer Forensics Tools: Software/ Hardware Tools.							
<b>UNIT V</b>	<b>ANALYSIS AND VALIDATION</b>					<b>9 Hours</b>	
Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics							
<b>TOTAL:</b>						<b>45 Hours</b>	
<b>COURSE OUTCOMES:</b>							
At the end of this course, students will be able to, CO1: Discuss the security issues network layer and transport layer CO2: Apply security principles in the application layer CO3: Explain computer forensics tools CO4: Understand the evidence collection and use forensic tools CO5: Analysis and Validate various forensics data							
<b>REFERENCES:</b>							
<ol style="list-style-type: none"> <li>1. Man Young Rhee, “Internet Security: Cryptographic Principles”, “Algorithms and Protocols”, Wiley Publications, 2014.</li> <li>2. Nelson, Phillips, Enfinger, Stuart, “Computer Forensics and Investigations”, Cengage Learning, India Edition, 2012</li> <li>3. John R.Vacca, “Computer Forensics”, Cengage Learning, 2013</li> <li>4. Richard E.Smith, “Internet Cryptography”, 3rd Edition Pearson Education, 2012.</li> <li>5. MarjieT.Britz, “Computer Forensics and Cyber Crime”: An Introduction”, 3 rd Edition, Prentice Hall, 2013.</li> <li>6. <a href="http://nptel.ac.in/">http://nptel.ac.in/</a></li> </ol>							

1703IT020	ROBOT PROGRAMMING		L	T	P	C	
			3	0	0	3	
<b>AIM:</b> To impart knowledge in the area of Robot designing and programming in Robotic languages							
<b>PREREQUISITE:</b> Object Oriented Programming, Artificial Intelligence, Computer Vision							
<b>COURSE OBJECTIVES:</b>							
<ol style="list-style-type: none"> <li>1. Teach the students about the kinematic arrangement of robots and its applications in the area of Intelligence systems</li> <li>2. Build a robot for any type of application</li> <li>3. Robot planning and navigation</li> <li>4. Robot locomotion and Mobile robot kinematics</li> </ol>							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9 Hours</b>	

Robot: Definition, Application, Classification – Degrees of Freedom – Specification – Types.		
<b>UNIT II</b>	<b>ROBOT PERCEPTION</b>	<b>9 Hours</b>
Computer Vision – Vision of Robotics – Image formation – Color tracking – Kinematics – Knowledge Representation – Learning Systems		
<b>UNIT III</b>	<b>ROBOT DYNAMICS</b>	<b>9 Hours</b>
Trajectory planning – Types of Programming – Teach Pendant programming – Artificial Intelligence Techniques - Expert system and its components		
<b>UNIT IV</b>	<b>SENSING TECHNIQUES</b>	<b>9 Hours</b>
Design of Robots – Sensors – Actuators - Localization and Navigation - planning and reacting – path planning – obstacle avoidance techniques		
<b>UNIT V</b>	<b>CASE STUDY</b>	<b>9 Hours</b>
Robot learning - Particle Swarm Optimization (PSO) – ant colony optimization (ACO) – swarm robotics - Collaborative Robots in the Classroom Deliver Hands-on Learning - OCTOPUZ, etc		
		<b>TOTAL: 45 Hours</b>
<b>COURSE OUTCOMES:</b>		
At the end of this course, students will be able to, CO1: Understand the introduction about Robot programming CO2: Explain different Robot perception techniques CO3: Understand the concepts Robot programming and AI CO4: Enumerate different sensing techniques CO5: Understand various real time case studies of Robot Programming		
<b>REFERENCES:</b>		
1. A. E. Elben and J. E. Smith, “Introduction to Evolutionary Computing”, Springer, 2014. 2. F. Neumann and C. Witt, “Bioinspired Computation in combinatorial optimization: Algorithms and their computational complexity”, Springer, 2013. 3. Roland Seigwart, Illah Reza Nourbakhsh, and Davide Scaramuzza, “Introduction to autonomous mobile robots”, Second Edition, MIT Press, 2011. 4. Sebastian Thrun, Wolfram Burgard, and Dieter Fox, “Probabilistic Robotics”, MIT Press, 2012. 5. Howie Choset et al., “Principles of Robot Motion: Theory, Algorithms, and Implementations”, A Bradford Book, 2011. 6. <a href="http://nptel.ac.in/">http://nptel.ac.in/</a>		

<b>1703CS020</b>	<b>SOFT COMPUTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>AIM:</b> To study the concepts of soft computing like neural networks, fuzzy logic, genetic algorithms and hybrid systems					
<b>COURSE OBJECTIVES:</b>					
1. Learn the various soft computing frame works. 2. Be familiar with design of various neural networks. 3. Be exposed to fuzzy logic. 4. Learn genetic programming and hybrid systems.					
<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9 Hours</b>			
Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks- basic models - important technologies - applications. Fuzzy logic: Introduction - crisp sets- fuzzy sets - crisp relations and fuzzy relations: cartesian product of relation - classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts.					
<b>UNIT II</b>	<b>NEURAL NETWORKS</b>	<b>9 Hours</b>			
McCulloch-Pitts neuron - linear separability - hebb network - supervised learning network: perceptron networks - adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN- associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative auto associative memory network & iterative associative memory network–unsupervised learning networks: Kohonen self organizing feature maps, LVQ – CP networks, ART network.					
<b>UNIT III</b>	<b>FUZZY LOGIC</b>	<b>9 Hours</b>			
Membership functions: features, fuzzification, methods of membership value assignments- Defuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic - extension principle - fuzzy measures - measures of fuzziness -fuzzy integrals - fuzzy rule base and approximate reasoning : truth values and tables, fuzzy					

propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert system-fuzzy decision making.		
<b>UNIT IV</b>	<b>GENETIC ALGORITHM</b>	<b>9 Hours</b>
Genetic algorithm and search space - general genetic algorithm – operators - Generational cycle - stopping condition – constraints - classification - genetic programming – multilevel optimization – real life problem- advances in GA.		
<b>UNIT V</b>	<b>HYBRID SOFT COMPUTING TECHNIQUES &amp; APPLICATIONS</b>	<b>9 Hours</b>
Neuro-fuzzy hybrid systems - genetic neuro hybrid systems - genetic fuzzy hybrid and fuzzy genetic hybrid systems - simplified fuzzy ARTMAP - Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.		
<b>TOTAL:</b>		<b>45 Hours</b>
<b>COURSE OUTCOMES:</b>		
At the end of this course, students will be able to, CO1: Understand the concepts of soft computing CO2: Explain various neural network process and algorithms CO3: Apply fuzzy logic to solve various problems CO4: Use fuzzy logic and apply genetic programming to solve real time problems CO5: Understand the hybrid soft computing.		
<b>REFERENCES:</b>		
<ol style="list-style-type: none"> <li>1. J.S.R.Jang, C.T. Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI / Pearson Education 2014.</li> <li>2. S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, 2011.</li> <li>3. S.Rajasekaran and G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis &amp; Applications", Prentice-Hall of India Pvt. Ltd., 2012.</li> <li>4. George J. Klir, Ute St. Clair, Bo Yuan, “Fuzzy Set Theory: Foundations and Applications” Prentice Hall, 2011</li> <li>5. David E. Goldberg, “Genetic Algorithm in Search Optimization and Machine Learning” Pearson Education India, 2013.</li> <li>6. James A. Freeman, David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 2010</li> <li>7. Simon Haykin, “Neural Networks Comprehensive Foundation” Second Edition, Pearson Education, 2010.</li> <li>8. <a href="http://nptel.ac.in/">http://nptel.ac.in/</a></li> </ol>		

<b>1703IT021</b>	<b>NATURAL LANGUAGE PROCESSING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>AIM:</b> To study the concept of Natural language processing and apply various techniques to solve real time models					
<b>COURSE OBJECTIVES:</b>					
<ol style="list-style-type: none"> <li>1. Learn the concept of regular expression and python programming</li> <li>2. Study of Bayes, Speech and Marckov models</li> <li>3. Study of Entropy, Random Process and Resolution Techniques</li> <li>4. Learn the concepts of Sentiment analysis and cross lingual platforms</li> </ol>					
<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9 Hours</b>			
Introduction and Overview Regular Expressions Programming in Python String Edit Distance and Alignment Context Free Grammars Non-probabilistic Parsing Information Theory					
<b>UNIT II</b>	<b>MODELING AND PARSING</b>	<b>9 Hours</b>			
Language modeling and Naive Bayes Part of Speech Tagging and Hidden Markov Models Viterbi Algorithm for Finding Most Likely HMM Path Probabilistic Context Free Grammars Parsing with PCFGs					
<b>UNIT III</b>	<b>ENTROPY</b>	<b>9 Hours</b>			
Maximum Entropy Classifiers Maximum Entropy Markov Models & Conditional Random Fields Lexical Semantics Dirichlet Multinomial Distributions Machine Translation Unsupervised Language Discovery Information Extraction & Reference Resolution					
<b>UNIT IV</b>	<b>SENTIMENT ANALYSIS</b>	<b>9 Hours</b>			
Sentiment Analysis; Text Entailment; Robust and Scalable Machine Translation; Question Answering in Multilingual Setting; Cross Lingual Information Retrieval (CLIR).					
<b>UNIT V</b>	<b>CASE STUDY</b>	<b>9 Hours</b>			
Information Extraction: Named entity recognition and relation extraction. IE using sequence labeling. Machine Translation (MT) Basic issues in MT. Statistical translation, word alignment, phrase-based translation, and					

synchronous grammars	<b>TOTAL:</b>	<b>45 Hours</b>
<b>COURSE OUTCOMES:</b>		
At the end of this course, students will be able to, CO1: Understand the concept of Natural Language processing and grammars CO2: Illustrate various models and parsing techniques CO3: Apply various entropy techniques to solve random inputs CO4: Explain various sentiment analysis techniques CO5: Compare and differentiate the various case study performance		
<b>REFERENCES:</b>		
<ol style="list-style-type: none"> <li>Allen, James, Natural Language Understanding, Second Edition, Benjamin/Cumming, 2013.</li> <li>Charniack, Eugene, Statistical Language Learning, MIT Press, 2014.</li> <li>Manning, Christopher and Heinrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 2012.</li> <li>Radford, Andrew et. al., Linguistics, An Introduction, Cambridge University Press, 2013.</li> <li>Journals : Computational Linguistics, Natural Language Engineering, Machine Learning, Machine Translation, Artificial Intelligence, 2012</li> <li>Conferences : Annual Meeting of the Association of Computational Linguistics (ACL), Computational Linguistics (COLING), European ACL (EACL), Empirical Methods in NLP (EMNLP), Annual Meeting of the Special Interest Group in Information Retrieval (SIGIR), Human Language Technology (HLT).</li> </ol>		

<b>1703IT022</b>	<b>SERVICE ORIENTED ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>AIM:</b> The main objective of this course is to understand the concepts about how business can benefit from this technology.					
<b>PREREQUISITES:</b> XML, Web programming and Web services					
<b>COURSE OBJECTIVES:</b>					
<ol style="list-style-type: none"> <li>To know about basic xml and their applications</li> <li>Study the basic principles of SOA</li> <li>Learn to SOA design patterns to improve flexibility and maintainability.</li> <li>Understand the model service operations and messages from business use cases</li> <li>To expose the Components capable of performing a task and a WSDL service.</li> </ol>					
<b>UNIT I</b>	<b>FUNDAMENTALS OF SOA</b>	<b>9 Hours</b>			
Introduction - Defining SOA - Evolution of SOA - Service Oriented Enterprise - Comparing SOA to client-Server and distributed internet architectures - Basic SOA Architecture – concepts - Key Service characteristics – Technical Benefits - Business Benefits					
<b>UNIT II</b>	<b>REVIEW OF XML</b>	<b>9 Hours</b>			
XML document structure – well formed and valid documents – namespaces – DTD – XML Schema – Parsing XML – SAX – modeling databases in XML					
<b>UNIT III</b>	<b>SOA AND SERVICE ORIENTATION</b>	<b>9 Hours</b>			
Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns- Web Service Platform-Service Contract-Service Level Data Model-Service Discovery-Service Level Security-Service Level Interaction Patterns-Atomic and Composite Services-Service Enabling Legacy System-Enterprise Service Bus Pattern					
<b>UNIT IV</b>	<b>COMBINING SOA AND WEB SERVICES</b>	<b>9 Hours</b>			
Sentiment Analysis; Text Entailment; Robust and Scalable Machine Translation; Question Answering in Multilingual Setting; Cross Lingual Information Retrieval (CLIR).					
<b>UNIT V</b>	<b>SOA PLATFORMS</b>	<b>9 Hours</b>			
SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC) - Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE)					
<b>TOTAL:</b>					<b>45 Hours</b>
<b>COURSE OUTCOMES:</b>					
At the end of this course, students will be able to, CO1: Explain the fundamental principles of SOA.					

- CO2: Organize the services to perform the service composition.  
CO3: Model and design a service-oriented system using architectural principles, development methods with SOA and service-related technologies systematically and effectively  
CO4: Outline the technologies used for SOA implementation  
CO5: Demonstrate software development using SOA as a team

**REFERENCES:**

1. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2015.
2. Thomas Erl, “SOA Principles of Service Design —The Prentice Hall Service-Oriented Computing Series from Thomas Erl, 2014
3. James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, —Java Web Services Architecture, Elsevier, 2013
4. Newcomer, Lomow, —Understanding SOA with Web Services, Pearson Education, 2010
5. Dan Woods and Thomas Mattern, —Enterprise SOA Designing IT for Business Innovation O’REILLY, First Edition, 2011
6. <http://nptel.ac.in>

<b>1703IT023</b>	<b>HUMAN COMPUTER INTERACTION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. Learn the foundations of Human Computer Interaction.
2. Be familiar with the design technologies for individuals and persons with disabilities.
3. Be aware of mobile HCI.
4. Learn the guidelines for user interface.

<b>UNIT I</b>	<b>PRINCIPLES OF HCI</b>	<b>9 Hours</b>
---------------	--------------------------	----------------

History and Foundations of HCI – Human: Human Capabilities –I/O channels – Memory – Reasoning and problem solving; The computer: Devices –Memory – processing and networks; The Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms

<b>UNIT II</b>	<b>THE DESIGN PROCESS</b>	<b>9 Hours</b>
----------------	---------------------------	----------------

Interactive Design fundamentals – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in the software process: software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules –Implementation Tools – Evaluation and User Support.

<b>UNIT III</b>	<b>MODELS AND THEORIES</b>	<b>9 Hours</b>
-----------------	----------------------------	----------------

User models: Cognitive models –Socio-organizational issues and stake holder requirements –Task Models and Dialogs: analysing tasks – dialog notations and design – Communication and collaboration models: Groupware and Computer-supported Collaborative Work Ubiquitous Computing – Virtual Reality and Augmented Reality – Hypertext, Multimedia and the World Wide Web

<b>UNIT IV</b>	<b>MOBILE HCI</b>	<b>9 Hours</b>
----------------	-------------------	----------------

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

<b>UNIT V</b>	<b>WEB INTERFACE DESIGN</b>	<b>9 Hours</b>
---------------	-----------------------------	----------------

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Future of HCI – Case Studies

<b>TOTAL:</b>	<b>45 Hours</b>
---------------	-----------------

**COURSE OUTCOMES:**

- At the end of this course, students will be able to,
- CO1: Design effective dialog for HCI.
  - CO2: Design effective HCI for individuals and persons with disabilities.
  - CO3: Assess the importance of user feedback.
  - CO4: Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
  - CO5: Develop meaningful user interface.

**REFERENCES:**

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2014.
2. Brian Fling, “Mobile Design and Development”, First Edition, O’Reilly Media Inc., 2012.
3. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O’Reilly, 2009

4. <http://nptel.ac.in>

1703MG003	HUMAN RIGHTS	L	T	P	C
		3	0	0	3
<b>AIM:</b> To sensitize the Engineering students to various aspects of Human Rights.					
<b>COURSE OBJECTIVES:</b>					
<ol style="list-style-type: none"> <li>To define the term human rights and understand why it is important.</li> <li>To sensitize the Engineering students to various aspects of Human Rights</li> <li>To know the historical foundations and current practice of protecting human rights</li> </ol>					
<b>UNIT I</b>	<b>FOUNDATION OF HUMAN RIGHTS</b>	<b>9 Hours</b>			
Meaning and concepts of human rights- Notion and classification of Rights –three generations of human rights- Basis and sources of human rights – Theories of human rights					
<b>UNIT II</b>	<b>SOCIAL AND ECONOMICAL IMPACT OF HUMAN RIGHTS</b>	<b>9 Hours</b>			
Social Hierarchy, prejudices and exploitation- Economic problems: poverty, illiteracy, food security and habitation – Rural to urban migration: domestic displace to persons- Human rights of SC, ST, OBC and Minorities. Mechanisms for the protection of the rights of disadvantaged groups.					
<b>UNIT III</b>	<b>HUMAN RIGHTS OF THE WOMEN, CHILDREN AND WORKERS</b>	<b>9 Hours</b>			
Gender Bias, Harassment and offenses against women – Special laws and institutional mechanism for the protection of women’s rights- Nature and Issues in child rights in India and mechanism for the protection of the child rights. (UN Convention, UNESCO Convention, and ILO Conventions) – Occupational health hazards: Bonded and un organized workers: Protection mechanisms.					
<b>UNIT IV</b>	<b>ENVIRONMENTAL IMPACT OF HUMAN RIGHTS</b>	<b>9 Hours</b>			
Forest depletion and pollution of reverse system (culprits and victims)- hazards waste and discarded technological instruments-National and international obligation and Laws: RIO and KYOTO Declarations- Pollution control Mechanisms- Measures taken in India					
<b>UNIT V</b>	<b>HUMAN RIGHTS AND DUTIES IN INTERNATIONAL PERSPECTIVE</b>	<b>9 Hours</b>			
Emergence of international humanitarian law- UN charter provisions of human rights- the role of the UN security council and other international organization- Amnesty and red cross- International convention on elimination of all forms of racial discrimination					
<b>TOTAL:</b>					<b>45 Hours</b>
<b>FURTHER READING:</b> Role of NGO, Human Rights Education: Problems and Prospects					
<b>COURSE OUTCOMES:</b>					
At the end of this course, students will be able to,					
CO1: Understand the principles and institutions of international human rights law, including their origins, assumptions, contents, limits and potential					
CO2: Promote human rights through legal as well as non-legal means					
CO3: Understand different forms of promoting and implementing human rights, domestically as well as on the international level					
CO4: Identify, contextualize and use information about the human rights					
CO5: Participate in legal, political and other debates involving human rights in a knowledgeable and constructive way					
<b>REFERENCES:</b>					
<ol style="list-style-type: none"> <li>Kapoor S.K., —Human Rights under International law and Indian Laws, Central Law Agency, Allahabad, 2014.</li> <li>Chandra U., —Human Rights, Allahabad Law Agency, Allahabad, 2014.</li> <li>Landman, Todd. “Comparative Politics and Human Rights,” Human Rights Quarterly.2002</li> <li>Forsythe, David. P - Human Rights in International Relations, New York: Cam-bridge University Press, 2001</li> <li>Lauren, Paul Gordon. -“The Universal Declaration of Human Rights,” in The Evolution of Human Rights, University of Pennsylvania Press,2000</li> </ol>					

1703IT024	GRAPH THEORY	L	T	P	C
		3	0	0	3
<b>AIM:</b> The main objective of this course is combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions using graph theory.					



<b>PREREQUISITE:</b> Design and Analysis of Algorithm	
<b>COURSE OBJECTIVES:</b>	
<ol style="list-style-type: none"> <li>1. Be familiar with the most fundamental Graph Theory topics and results.</li> <li>2. Be exposed to the techniques of proofs and analysis</li> </ol>	
<b>UNIT I</b>	<b>INTRODUCTION</b> <span style="float: right;"><b>9 Hours</b></span>
Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees	
<b>UNIT II</b>	<b>TREES, CONNECTIVITY &amp; PLANARITY</b> <span style="float: right;"><b>9 Hours</b></span>
Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network	
<b>UNIT III</b>	<b>MATRICES, COLOURING AND DIRECTED GRAPH</b> <span style="float: right;"><b>9 Hours</b></span>
Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs..	
<b>UNIT IV</b>	<b>PERMUTATIONS &amp; COMBINATIONS</b> <span style="float: right;"><b>9 Hours</b></span>
Fundamental principles of counting - Permutations and combinations - Binomial theorem - combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion - Derangements - Arrangements with forbidden positions.	
<b>UNIT V</b>	<b>GENERATING FUNCTIONS</b> <span style="float: right;"><b>9 Hours</b></span>
Generating functions - Partitions of integers - Exponential generating function – Summation operator - Recurrence relations - First order and second order – Non-homogeneous recurrence relations - Method of generating functions.	
<b>TOTAL: 45 Hours</b>	
<b>COURSE OUTCOMES:</b>	
At the end of this course, students will be able to, CO1: Write precise and accurate mathematical definitions of objects in graph theory. CO2: Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples. CO3: Validate and critically assess a mathematical proof. CO4: Reason from definitions to construct mathematical proofs	
<b>REFERENCES:</b>	
<ol style="list-style-type: none"> <li>1. Clark J. and Holton D.A, “A First Look at Graph Theory”, Allied Publishers, 2015.</li> <li>2. Mott J.L., Kandel A. and Baker T.P. “Discrete Mathematics for Computer Scientists and Mathematicians” , Prentice Hall of India, 2011.</li> <li>3. Liu C.L., “Elements of Discrete Mathematics”, Mc Graw Hill, 2010.</li> <li>4. Rosen K.H., “Discrete Mathematics and Its Applications”, Mc Graw Hill, 2008.</li> <li>5. <a href="http://nptel.ac.in">http://nptel.ac.in</a></li> </ol>	

<b>1703IT025</b>	<b>SOFTWARE QUALITY ASSURANCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>AIM:</b> The main objective of this course is used to introduce the concepts of software Quality and Quality Management in IT sector					
<b>PREREQUISITE:</b> Software Engineering and Project Management					
<b>COURSE OBJECTIVES:</b>					
<ol style="list-style-type: none"> <li>1. Understand the basic tenets of software quality and quality factors.</li> <li>2. Be exposed to the Software Quality Assurance (SQA) architecture and the details of SQA components.</li> <li>3. Understand of how the SQA components can be integrated into the project life cycle.</li> <li>4. Be familiar with the software quality infrastructure.</li> <li>5. Be exposed to the management components of software quality.</li> </ol>					
<b>UNIT I</b>	<b>INTRODUCTION TO SOFTWARE QUALITY &amp; ARCHITECTURE</b>	<b>9 Hours</b>			
Need for Software quality – Quality challenges – Software quality assurance (SQA) – Software quality factors- McCall’s quality model – SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans.					

<b>UNIT II</b>	<b>SQA COMPONENTS AND PROJECT LIFE CYCLE</b>	<b>9 Hours</b>
Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE tools for software quality – Software maintenance quality – Project Management.		
<b>UNIT III</b>	<b>SOFTWARE QUALITY INFRASTRUCTURE</b>	<b>9 Hours</b>
Procedures and work instructions - Templates - Checklists – 3S development - Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit -Documentation control – Storage and retrieval.		
<b>UNIT IV</b>	<b>SOFTWARE QUALITY MANAGEMENT &amp; METRICS</b>	<b>9 Hours</b>
Project process control – Computerized tools - Software quality metrics – Objectives of quality measurement – Process & Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model.		
<b>UNIT V</b>	<b>STANDARDS, CERTIFICATIONS &amp; ASSESSMENTS</b>	<b>9 Hours</b>
Quality management standards – ISO 9001 and ISO 9000-3 – CMM and CMMI assessment methodologies - Bootstrap methodology – SPICE Project – SQA project process standards – IEEE st 1012 & 1028 – Organization of Quality Assurance – Department management responsibilities – Project management responsibilities – SQA units and other actors in SQA systems		
<b>TOTAL:</b>		<b>45 Hours</b>
<b>COURSE OUTCOMES:</b>		
At the end of this course, students will be able to, CO1: Utilize the concepts in software development life cycle. CO2: Demonstrate their capability to adopt quality standards. CO3: Assess the quality of software product. CO4: Apply the concepts in preparing the quality plan & documents.		
<b>REFERENCES:</b>		
1. Daniel Galin, “Software Quality Assurance”, Pearson Publication, 2015. 2. Alan C. Gillies, “Software Quality: Theory and Management”, International Thomson Computer Press, 2012. 3. Mordechai Ben-Menachem “Software Quality: Producing Practical Consistent Software”, International Thomson Computer Press, 2012. 4. <a href="http://nptel.ac.in">http://nptel.ac.in</a>		

<b>1703IT026</b>	<b>GAME PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>AIM:</b> The goals of this course are to provide introductions to event driven programming, game engine scripting, game engine class structures, learning to plan and to report on a significant programming project, learn to work in programming in teams, and learn to use standard game development environments, in particular the Unity 3D development platform.					
<b>PREREQUISITE:</b> Computer Graphics and Multimedia, Java Programming, Web Programming					
<b>COURSE OBJECTIVES:</b>					
1. Understand the concepts of Game design and development. 2. Learn the processes, mechanics and issues in Game Design. 3. Be exposed to the Core architectures of Game Programming. 4. Know about Game programming platforms, frame works and engines. 5. Learn to develop games.					
<b>UNIT I</b>	<b>3D GRAPHICS FOR GAME PROGRAMMING</b>	<b>9 Hours</b>			
3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-based Simulation, Scene Graphs.					
<b>UNIT II</b>	<b>GAME ENGINE DESIGN</b>	<b>9 Hours</b>			
Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling					
<b>UNIT III</b>	<b>GAME PROGRAMMING</b>	<b>9 Hours</b>			
2D and 3D Game development using Flash, DirectX, Java, Python, Game engines - DX Studio, Unity.					
<b>UNIT IV</b>	<b>GAMING PLATFORMS AND FRAMEWORKS</b>	<b>9 Hours</b>			

Project process control – Computerized tools - Software quality metrics – Objectives of quality measurement – Process & Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model.	
<b>UNIT V</b>	<b>GAME DEVELOPMENT</b>
Developing 2D and 3D interactive games using DirectX or Python – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.	
<b>TOTAL: 45 Hours</b>	
<b>COURSE OUTCOMES:</b>	
At the end of this course, students will be able to, CO1: Discuss the concepts of Game design and development. CO2: Design the processes, and use mechanics for game development. CO3: Explain the Core architectures of Game Programming. CO4: Use Game programming platforms, frame works and engines. CO5: Create interactive Games using various tools.	
<b>REFERENCES:</b>	
1. Mike Mc Shaffrfy and David Graham, “Game Coding Complete”, Fourth Edition, Cengage Learning, PTR, 2015. 2. Jason Gregory, “Game Engine Architecture”, CRC Press / A K Peters, 2012. 3. David H. Eberly, “3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics” 2nd Editions, Morgan Kaufmann, 2011. 4. Ernest Adams and Andrew Rollings, “Fundamentals of Game Design”, 2nd Edition Prentice Hall / New Riders, 2009. 5. Jesse Schell, The Art of Game Design: A book of lenses, 1st Edition, CRC Press, 2008. 6. <a href="http://nptel.ac.in">http://nptel.ac.in</a>	

<b>1703MG004</b>	<b>INTELLECTUAL PROPERTY RIGHTS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>AIM:</b> To learn the intellectual property rights and compare/correlate international and Indian IPR					
<b>COURSE OBJECTIVES:</b>					
1. To know about their rights for the protection of their invention done in their project work. 2. To learn about the patents processing system 3. To be familiar with copyrights and IPR related issues					
<b>UNIT I</b>	<b>INTRODUCTION TO IPR</b>	<b>9 Hours</b>			
Basic types of property - Tangible and Intangible property - Movable Property and Immovable Property - Intellectual Property – Invention and Creativity - Innovation – Intellectual Property (IP) – Importance – Protection of IPR.					
<b>UNIT II</b>	<b>CLASSIFICATIONS OF IPR</b>	<b>9 Hours</b>			
IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures.					
<b>UNIT III</b>	<b>INTERNATIONAL TREATIES ON IPR</b>	<b>9 Hours</b>			
International convention relating to Intellectual Property – TRIPS Agreement - Madrid Agreement - Hague Agreement - Budapest Treaty; Berne convention-Patent cooperation treaty-Paris convention-Lisbon Agreement – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).					
<b>UNIT IV</b>	<b>INDIAN IPR LEGISLATIONS</b>	<b>9 Hours</b>			
Indian Position Vs WTO and Strategies – The Patent Act, 1970 – Inventions Non-Patentable – Compulsory licensing – Patents of Addition – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.					
<b>UNIT V</b>	<b>IPR IN ELECTRONICS AND INFORMATION TECHNOLOGY</b>	<b>9 Hours</b>			
IPR in Electronics & Information Technology -Case Studies on – Patents pertaining to Electronics & Information Technology – Software patents International scenario – Patent & Copyright Protection for software& Electronic inventions - IPR in Electronics and Information Technology.					
<b>TOTAL: 45 Hours</b>					
<b>FURTHER READING:</b> New developments in trade mark laws, Registering patents in India and Foreign countries					
<b>COURSE OUTCOMES:</b>					
At the end of this course, students will be able to,					

- CO1: Understands the legal issues on Intellectual Property Rights  
 CO2: An ability to register a trade mark, copyrights, patents  
 CO3: Predict issues related to Intellectual property rights on trademarks, copyrights and patents  
 CO4: Summarize and evaluate trade secrets, unfair competition which is being adopted by various firms.  
 CO5: Distinguish between legal procedures for patents and copyrights.

**REFERENCES:**

1. BARE ACT, Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., 2007.
2. V. Sople Vinod, Managing Intellectual Property by (Prentice Hall of India Pvt.Ltd), 2006.
3. Deborah E. Bouchoux, —Intellectual Property Rights, Cengage Learning India Private Ltd, 2005.
4. Stim,—Intellectual Property Copyrights, trademarks, and Patents, Cengage Learning India Private Ltd, 2004.
5. Prabuddha Ganguli, —Intellectual Property Rights, TMH, 2001.
6. Lal, C.S, —Intellectual property handbook: copyright, designs, patent and trademarks, Law Publishers Allahabad, 2000.

<b>1703IT027</b>	<b>DEEP LEARNING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**AIM:** To study the concepts of Deep Learning process and analytics procedures

**PREREQUISITE:** Data Warehousing And Data Mining, Artificial Intelligence

**COURSE OBJECTIVES:**

1. Teach the concepts of deep learning process
2. Study the deep learning Strategies 1 and 2
3. Study of various learning and classification techniques
4. Study of various real time case studies of deep learning process

**UNIT I INTRODUCTION 9 Hours**

Review of Artificial Intelligence – Neural Networks – Supervised Learning – Back Propagations

**UNIT II DEEP LEARNING STRATEGIES - 1 9 Hours**

Properties of CNN representations: inevitability, stability, invariance – Localization – Regression - RNNs

**UNIT III DEEP LEARNING STRATEGIES - 2 9 Hours**

Deep Unsupervised Learning – Auto encoders (standard, de-noising, contractive, etc etc) - Variation Auto encoders - Adversarial Generative Networks - Maximum Entropy Distributions

**UNIT IV LEARNING AND CLASSIFICATION 9 Hours**

Reinforced Learning — Learning Agents – Binary Classification – Multi Class Classification - CNN Classification – Deep Belief – Computer Vision

**UNIT V CASE STUDY 9 Hours**

Medical Imaging – Natural Language Processing - Speech Processing – Secure Online Processing – Fraud Detection – Cyber Forensics

**TOTAL: 45 Hours**

**COURSE OUTCOMES:**

At the end of this course, students will be able to,

- CO1: Understand the concept of deep learning
- CO2: Explain different representation and strategies of deep learning
- CO3: Explain various unsupervised deep learning techniques and networks
- CO4: Understand learning and classification techniques
- CO5: Demonstrate various case studies of deep learning applications

**REFERENCES:**

1. Daniel Graupe, “Deep Learning Neural Networks and Case Studies”, World Scientific Publishing Co. Pt. Ltd, 2016
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning (Adaptive Computation and Machine Learning series)”, MIT Press, 2017
3. Nikhil Buduma, Nicholas Locascio Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms, O'Reilly Media; 1 edition, 2017
4. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly Media; 1 edition, 2017
5. Russell Reed (Author), Robert J Marks II, Neural Smthing: Supervised

Learning in Feed forward Artificial Neural Networks, MIT Press A  
Bradford Book, 2012  
6. <http://nptel.ac.in>

<b>1703IT028</b>	<b>BUSINESS INTELLIGENCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**AIM:** To learn the concepts on business intelligence and strategic plans

**PREREQUISITE:** Software Engineering and Project Management

**COURSE OBJECTIVES:**

1. Be exposed with the basic rudiments of business intelligence system
2. Understand the modeling aspects behind Business Intelligence
3. Understand of the business intelligence life cycle and the techniques used in it
4. Be exposed with different data analysis tools and techniques

**UNIT I BUSINESS INTELLIGENCE 9 Hours**

Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

**UNIT II KNOWLEDGE DELIVERY 9 Hours**

The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.

**UNIT III BUSINESS INTELLIGENCE MODELS 9 Hours**

Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – Virtual inputs and outputs

**UNIT IV BUSINESS INTELLIGENCE APPLICATIONS 9 Hours**

Pattern matching – cluster analysis, outlier analysis - Emerging Technologies - Machine Learning – BI Search & Text Analytics - Advanced Visualization – Rich Report

**UNIT V CASE STUDY 9 Hours**

Google Analytics Instant Activation - IBM Watson Cognitive Computing - IoT and Azure Stream Analytics - Coca-Cola Amatil: Trax Retail Execution - AgilOne Advanced Analytics

**TOTAL: 45 Hours**

**COURSE OUTCOMES:**

- At the end of this course, students will be able to,
- CO1: Explain the fundamentals of business intelligence.
  - CO2: Link data mining with business intelligence.
  - CO3: Apply various modeling techniques.
  - CO4: Explain the data analysis and knowledge delivery stages.
  - CO5: Apply business intelligence methods to various situations and decide on appropriate technique.

**REFERENCES:**

1. Efraim Turban, Ramesh Sharda, Dursun Delen, “Decision Support and Business Intelligence Systems”, 9th Edition, Pearson 2015.
2. Larissa T. Moss, S. Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making”, Addison Wesley, 2013.
3. Carlo Vercellis, “Business Intelligence: Data Mining and Optimization for Decision Making”, Wiley Publications, 2011.
4. David Loshin Morgan, Kaufman, “Business Intelligence: The Savvy Manager’s Guide”, Second Edition, 2012.
5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, “The Data Warehouse Lifecycle Toolkit”, Wiley Publication Inc.,2012.
6. <http://nptel.ac.in>

<b>1703IT029</b>	<b>VISUALIZATION TECHNIQUES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**AIM:** To various visualization techniques and computer graphics usages

**PREREQUISITE:** Software Engineering and Project Management

<b>COURSE OBJECTIVES:</b>		
<ol style="list-style-type: none"> <li>1. Understand basic visualization and interaction techniques in the information visualization fields</li> <li>2. Understand basic approaches to visually exploring large databases</li> <li>3. Explore different abstraction mechanisms</li> <li>4. Create interactive visual interfaces</li> </ol>		
<b>UNIT I</b>	<b>DATA VISUALIZATION</b>	<b>9 Hours</b>
Overview of Data Visualization – Visualization Stages – Perception Gibson - Affordance Theory – A Model of Perceptual Processing – Types of Data		
<b>UNIT II</b>	<b>COMPUTER VISUALIZATION</b>	<b>9 Hours</b>
Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye Views – Fisheye Views for 3D data – Non Linear Magnification – Comparing Visualization of Information Spaces – Abstraction in Computer Graphics – Abstraction in User Interfaces		
<b>UNIT III</b>	<b>MULTIDIMENSIONAL COMPUTER VISUALIZATION</b>	<b>9 Hours</b>
Multiple Dimensions models – Trees – Web Works – Data Mapping: Document Visualization – Workspaces.		
<b>UNIT IV</b>	<b>TEXTUAL METHODS OF ABSTRACTION</b>	<b>9 Hours</b>
From Graphics to Pure Text – Figure Captions in Visual Interfaces – Interactive 3D Illustrations with Images and Text – Consistency of rendered Images and their Textual labels – Architecture – Zoom Techniques– Interactive Handling of Images and Text		
<b>UNIT V</b>	<b>CASE STUDY</b>	<b>9 Hours</b>
Virtual reality - Augmented reality - <u>Tableau</u> – <u>Fusion Charts</u> – <u>High charts</u> – Plotly - <u>Sisense</u>		
<b>TOTAL:</b>		<b>45 Hours</b>
<b>COURSE OUTCOMES:</b>		
At the end of this course, students will be able to,		
<ul style="list-style-type: none"> <li>CO1: Understand various visualization techniques</li> <li>CO2: Explain the process of computer visualization techniques</li> <li>CO3: Understand various multidimensional computer models</li> <li>CO4: Apply various textual methods to solve interactive and rendering applications</li> <li>CO5: Illustrate various abstraction and interaction system process</li> </ul>		
<b>REFERENCES:</b>		
<ol style="list-style-type: none"> <li>1. Thomas Strothotte, —Computer Visualization–Graphics Abstraction and Interactivity], Springer, 2015.</li> <li>2. Colin Ware —Information Visualization Perception for Design], Second edition, Morgan Kaufman 2013.</li> <li>3. Stuart.K. Card, Jock.D. Mackinlay and Ben Shneiderman, —Readings in Information Visualization Using Vision to Think], Morgan Kaufmann Publishers, 2012</li> <li>4. <a href="http://nptel.ac.in">http://nptel.ac.in</a></li> </ol>		

<b>1703IT030</b>	<b>BIO INFORMATICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>COURSE OBJECTIVES:</b>					
<ol style="list-style-type: none"> <li>1. To understand the need for Bioinformatics technologies.</li> <li>2. To familiarize with the modeling techniques.</li> <li>3. To learn microarray analysis.</li> <li>5. To understand Pattern Matching and Visualization techniques</li> </ol>					
<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9 Hours</b>			
Need for Bioinformatics technologies Basics of Bioinformatics technologies– Structural bioinformatics – Data format and processing – Secondary resources and applications – Role of Structural bioinformatics – Biological Data Integration System.					
<b>UNIT II</b>	<b>DATA WAREHOUSING AND DATAMINING IN BIOINFORMATICS</b>	<b>9 Hours</b>			
Bioinformatics data – Data warehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics.					
<b>UNIT III</b>	<b>MODELLING FOR BIOINFORMATICS</b>	<b>9 Hours</b>			
Hidden markov modeling for biological data analysis – Sequence identification –Sequence classification – multiple					

alignment generation – Comparative modeling –Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks – Molecular modeling – Computer programs for molecular modeling.		
<b>UNIT IV</b>	<b>PATTERN MATCHING AND VISUALIZATION</b>	<b>9 Hours</b>
Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization – Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences.		
<b>UNIT V</b>	<b>MICROARRAY ANALYSIS</b>	<b>9 Hours</b>
Microarray technology for genome expression study – image analysis for data extraction – pre-processing – segmentation – gridding – spot extraction – normalization, filtering – cluster analysis – gene network analysis – Compared Evaluation of Scientific Data Management Systems – Cost Matrix – Evaluation model – Benchmark – Trade-offs.		
<b>TOTAL:</b>		<b>45 Hours</b>
<b>COURSE OUTCOMES:</b>		
At the end of this course, students will be able to, CO1: Develop models for biological data CO2: Apply pattern matching techniques to bioinformatics data – protein data genomic data. CO3: Apply micro array technology for genomic expression study		
<b>REFERENCES:</b>		
<ol style="list-style-type: none"> <li>1. Yi-Ping Phoebe Chen (Ed), “BioInformatics Technologies”, First Indian Reprint, Springer Verlag, 2013.</li> <li>2. Bryan Bergeron, “Bio Informatics Computing”, Second Edition, Pearson Education, 2012.</li> <li>3. Arthur M Lesk, “Introduction to Bioinformatics”, Second Edition, Oxford University Press, 2008</li> <li>4. <a href="http://nptel.ac.in">http://nptel.ac.in</a></li> </ol>		

## ONE CREDIT COURSES

<b>1704IT001</b>	<b>PYTHON PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>AIM:</b> This course is used to understand the concepts problem solving using Python Programming					
<b>PREREQUISITE:</b> Programming in C, Programming in C++					
<b>COURSE OBJECTIVES:</b>					
1. Learn and Solve problems using Python Programming					
<b>Python Programming</b>					
<ol style="list-style-type: none"> <li>1. Study the fundamental concepts of Python (Introductions, History, Installation and Running procedure)</li> <li>2. Simple program using Data types, Keywords, Identifier, Conditional and Control Statements, Looping</li> <li>3. Write Python Program using Tuples, List, Sorting and Searching</li> <li>4. Write Python Program to implement File Handling and Exception Handling</li> <li>5. Implement Python Concepts using Copying, Packages, real time operations</li> </ol>					
<b>TOTAL:</b>					<b>15 Hours</b>
<b>COURSE OUTCOMES:</b>					
At the end of this course, students will be able to, CO1: Write the python program using Data types, Keywords, Arrays and Date & Time CO2: Write the python program using File Handling and Real time examples					
<b>REFERENCES:</b>					
<ol style="list-style-type: none"> <li>1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016 (<a href="http://greenteapress.com/wp/think-python/">http://greenteapress.com/wp/think-python/</a>)</li> <li>2. Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.</li> <li>3. Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013</li> </ol>					

<b>1704IT002</b>	<b>PERL PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>AIM:</b> This course is used to understand the concepts problem solving using Perl Programming					
<b>PREREQUISITE:</b> Programming in C, Programming in C++					

<b>COURSE OBJECTIVES:</b>	
1. Learn and Solve problems using Perl Programming	
<b>Perl Programming</b>	
<ol style="list-style-type: none"> <li>1. Study the fundamental concepts of Perl (Introductions, History, Installation and Running procedure)</li> <li>2. Write Perl program using Data types, Keywords, Conditional and Control Statements, Looping</li> <li>3. Write Perl Program using Scalars, Arrays, Data &amp; Times and Routines</li> <li>4. Write Perl Program to implement Object Oriented Concepts</li> <li>5. Implement Perl Concepts using Socket, Email Applications, Embedded Documentations, Database Applications</li> </ol>	
<b>TOTAL: 15 Hours</b>	
<b>COURSE OUTCOMES:</b>	
At the end of this course, students will be able to,	
CO1: Write the perl program using Data types, Keywords, Arrays and Date & Time	
CO2: Write the perl program using Object Oriented and Real time examples	
<b>REFERENCES:</b>	
<ol style="list-style-type: none"> <li>1. <u>Christiansen</u> (Author), <u>Tom</u> (Author)_Programming Perl, Shroff Publishers &amp; Distributers Private Limited - Mumbai; Fourth edition (2015)</li> <li>2. <u>Martin Brown</u> Perl: The Complete Reference McGraw Hill Education; 2 edition 2012</li> <li>3. <u>Schwartz</u> (Author), <u>Randal L.</u> Learning Perl Shroff; Sixth edition (2011)</li> </ol>	

<b>1704IT003</b>	<b>ANGULAR JS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>AIM:</b> This course is used to understand the concepts problem solving using Angular JS					
<b>PREREQUISITE:</b> Java Programming, Web Programming					
<b>COURSE OBJECTIVES:</b>					
1. Learn and Solve problems using Angular JS					
<b>Experiments:</b>					
<ol style="list-style-type: none"> <li>1. Introduction to Angular JS MVC Architecture,</li> <li>2. Expression and Data Binding – Strings, Objects, Arrays</li> <li>3. Working with Directives – Core, Conditional, Events</li> <li>4. Filters and Forms</li> <li>5. Modules and Routing</li> <li>6. Controllers and Services</li> </ol>					
<b>TOTAL: 15 Hours</b>					
<b>COURSE OUTCOMES:</b>					
At the end of this course, students will be able to,					
CO1: Understand the concepts of Angular JS					
CO2: Write the Angular JS programme using data binging and directives					
CO3: Design forms and filters using Angular JS					
CO4: Implement routing, controllers and services operations for real time example					
<b>REFERENCES:</b>					
<ol style="list-style-type: none"> <li>1. <u>Na</u>, AngularJS: Up and Running, Shroff/O'Reilly; First edition (1 January 2014), ISBN: 9351108015</li> <li>2. <u>iCode Academy</u>, Angular JS for Beginners: Your Guide to Easily Learn Angular JS In 7 Days, Kindle Edition, Amazon Asia-Pacific Holdings Private Limit, 2016</li> <li>3. <u>Green</u> and Brad, Angular JS, Shroff; First edition (2013), ISBN: 9351101266</li> <li>4. <a href="https://www.w3schools.com/angular/default.asp">https://www.w3schools.com/angular/default.asp</a></li> <li>5. <a href="https://www.tutorialspoint.com/angularjs/angularjs_pdf_version.htm">https://www.tutorialspoint.com/angularjs/angularjs_pdf_version.htm</a></li> </ol>					
<b>1704IT004</b>	<b>SALES FORCE – TRAIL HEAD</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>AIM:</b> This course is used to learn sales force Trail Head self learning platforms					
<b>COURSE OBJECTIVES:</b>					
1. Learn and experiments trail head platform					
<b>URL:</b> <a href="https://trailhead.salesforce.com">https://trailhead.salesforce.com</a>					



<b>Target: Earn 50 badges</b>	
<b>Sample Modules:</b>	
<ol style="list-style-type: none"> <li>1. Start Learning Today with Trailhead</li> <li>2. <a href="#">Trailhead Basics</a></li> <li>3. <a href="#">Platform Essentials for Admins</a></li> <li>4. <a href="#">Quick Start: Apex Coding for Admins</a></li> <li>5. <a href="#">Query GitHub Data Using Big Query</a></li> <li>6. <a href="#">Data Modeling and Management</a></li> <li>7. Sales force mobile apps customization</li> <li>8. Sales Cloud</li> <li>9. Data Quality and Report</li> <li>10. Data Analytics</li> </ol>	
Not Limited to.	
<b>TOTAL:</b>	<b>15 Hours</b>
<b>COURSE OUTCOMES:</b>	
At the end of this course, students will be able to,	
<ul style="list-style-type: none"> <li>CO1: Understand the trail head platforms</li> <li>CO2: Apply trail head concepts in real time example</li> </ul>	

<b>1704IT005</b>	<b>VMWARE DATA CENTRE AND VIRTUALIZATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>

<b>COURSE OBJECTIVES:</b>	
<ol style="list-style-type: none"> <li>1. Data Center Virtualization will provide the participants with a fundamental understanding of VMware's Data Center Virtualization products. The course also takes the participants through the components and features of vSphere 6.0, and shows how the vSphere 6.0 product line helps resolve business and IT challenges commonly faced by organizations.</li> <li>2. The course will start by providing an overview of Data Center Virtualization with VMware vSphere, its components, capabilities, and benefits. The course then will introduce the components of vSphere that accomplish Data Center Virtualization. Finally, introduces how vSphere 6.0 products help resolve common data center challenges.</li> </ol>	
<b>MODULE 1 Introduction to Data Center Virtualization with VMware vSphere</b>	
What is "Data Center Virtualization"? Why do we need Data Center Virtualization? Challenges in the real world, Availability Challenges for the Company, Scalability Challenges for the Company, Optimization Challenges for the Company, Management Challenges for the Company, How can Data Center Virtualization help overcome these challenges?	
<b>MODULE 2 Components of VMware vSphere</b>	
What is a Virtual Machine?, What can a VM do?, How do VMs help me?, Your host: The Hypervisor ESXi Hypervisor, Host Management, vCenter, vMotion, Distributed Resource Scheduler (DRS), Distributed Power Management (DPM), Storage vMotion, Storage I/O Control, vSphere Data Protection (VDP), High Availability (HA), Fault Tolerance (FT) vSphere Replication (VR), Shared Storage, Storage Types, VSA, vFlash, Datastores, Networking, Virtual Networking	
What are Virtual Switches?, Virtual Switch Types, vSphere Product Placement, Data Center Virtualization Products, vCenter Operations Manager, vCenter Configuration Manager, vCenter Site Recovery Manager	
<b>MODULE 3 Applying what you've learned</b>	
Availability Challenges, Scalability Challenges for the Company, Optimization Challenges for the Company, Management Challenges for the Company, Road map: Where do I go from here?	
<b>TOTAL:</b>	<b>15 Hours</b>

<b>COURSE OUTCOMES:</b>	
At the end of this course, students will be able to,	
<ul style="list-style-type: none"> <li>CO1: Create VMware Application model using vSphere systems</li> <li>CO2: Create vCenter using various VMware components</li> <li>CO3: Apply VMware model using Management console and optimization policies</li> </ul>	

<b>REFERENCES:</b>	
1. <a href="#">Brian Atkinson</a> , "VCP5-DCV VMware Certified Professional-Data Center Virtualization on vSphere Study	

- Guide: Exam VCP-550”, Wiley; Study Guide edition, 2014
2. Nick Marshall, Grant Orchard, Josh Atwell, Scott Lowe, “Mastering VMware vSphere 6 (SYBEX)”, Wiley-2015
  3. VMware Data Centre Virtualization Foundations, VMware Education Services, VMware, Inc.2016
  4. [www.vmware.com/education](http://www.vmware.com/education)

1704IT006	R - PROGRAMMING	L	T	P	C
		0	0	0	1
<b>PREREQUISITE:</b> Some basic knowledge of programming, probability and statistics. If in doubt about the prerequisites, please consult with the instructor for permission to take the class.					
<b>COURSE OBJECTIVES:</b>					
In this course you will learn how to program in R and how to use R for effective data analysis. You will learn how to install and configure software necessary for a statistical programming environment; discuss generic programming language concepts as they are implemented in a high-level statistical language. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, and organizing and commenting R code. Topics in statistical data analysis and optimization will provide working examples.					
<b>Tool: R Studio</b>					
<b>Experiments:</b>					
<ol style="list-style-type: none"> <li>1. Background, Getting Started, and Nuts &amp; Bolts</li> <li>2. Programming with R</li> <li>3. Loop Functions and Debugging</li> <li>4. Simulation &amp; Profiling</li> <li>5. Data Manipulation</li> <li>6. Packaging, Debugging and Object Oriented Programming</li> <li>7. Data Visualization</li> <li>8. Clustering</li> <li>9. Regression and Classification</li> <li>10. Data Analytics</li> <li>11. Case Study</li> <li>12. Project Presentation</li> </ol>					
<b>TOTAL:</b>					<b>15 Hours</b>
<b>COURSE OUTCOMES:</b>					
At the end of this course, students will be able to,					
CO1: Understand the concept of R – Programming					
CO2: Apply R-Studio to solve looping, simulation and data manipulation					
CO3: Apply R-Studio to solve Data visualization and Clustering					
CO4: Create Project using Regression, Classification and Analytics using R					
CO5: Understand various case studies of R-Programming applications					
<b>REFERENCES:</b>					
<ol style="list-style-type: none"> <li>1. R Programming for Data Science, by Roger D. Peng, 2016</li> <li>2. Using R for Introductory Statistics, by John Verzani, Chapman &amp; Hall/CRC, 2012</li> <li>3. Advanced R, by Hadley Wickham, ISBN 978146658696, 2015</li> <li>4. <a href="https://leanpub.com/rprogramming">https://leanpub.com/rprogramming</a></li> </ol>					

1704IT007	EMC CLOUD INFRASTRUCTURE AND SERVICES	L	T	P	C
		0	0	0	1
<b>PREREQUISITE:</b> Working with Web browser, Computer Programming and Simulation Environments					
<b>COURSE OBJECTIVES:</b>					
In this course you will learn how to use EMC Cloud services and understand the concepts of Cloud Infrastructure module.					
<b>Module 1:</b> Journey to the Cloud - Classic Data Center - Virtualized Data Center: Computer, Storage					
<b>Module 2:</b> Virtualized Data Center: Networking - Desktop and Application - Business Continuity in VDC					

<b>Module 3:</b> Cloud computing primer - Cloud Infrastructure and Management - Cloud Security - Cloud Migration Considerations	
<b>Module 4:</b> Case Study and Simulation: EMC Cloud Services	
<b>TOTAL:</b>	<b>15 Hours</b>
<b>COURSE OUTCOMES:</b>	
At the end of this course, students will be able to, CO1: Understand the concept of Cloud Computing CO2: Apply EMC Cloud Tool kit for solve Data Centre Virtualization CO3: Apply EMC Cloud Tool kit for solve Compute, Network, Desktop applications CO4: Apply EMC Cloud Tool kit for solve Cloud Migration	
<b>REFERENCES:</b>	
<ol style="list-style-type: none"> <li>1. Cloud Infrastructure and Services: Virtualization and Cloud Infrastructure Technology Concepts and Principles by EMC Education Services, Emc Education Services, 2015</li> <li>2. EMC Cloud Infrastructure and Services, EMC Proven Professional, 2014</li> <li>3. <a href="https://education.emc.com">https://education.emc.com</a></li> </ol>	

<b>1704IT008</b>	<b>AMAZON WEB SERVICES CLOUD COMPUTING ARCHITECT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>

<b>PREREQUISITE:</b> Working with Web browser, Computer Programming and Simulation Environments					
<b>COURSE OBJECTIVES:</b>					
In this course you will learn how to use AWS tools and solve cloud computing Architect using various AWS platforms					
<b>Module 1:</b> Introduction to Cloud Computing - AWS Compute, Storage and Networking - Creating Amazon EC2 instances with Microsoft Windows - Build your Virtual Private Cloud (VPC) and Launch a Web Server - Working with Amazon Elastic Block Store (EBS)					
<b>Module 2:</b> AWS Database Options - AWS Essentials Review - Forklift an Existing Application onto AWS - Making your Environment Highly Available					
<b>Module 3:</b> Event Driven Scaling - Using Auto Scaling with AWS Lambda and Lifecycle Hooks - Creating an Amazon VPC with AWS Cloud Formation - Designing Web-Scale Storage - Build an Environment for a New Web Application					
<b>Module 4: Well-Architected Best Practices</b> - Well Architected Pillar: Security, Reliability, Performance Efficiency, Cost Optimization - Using AWS Services to Enhance a Web Application					
<b>Module 5:</b> Deployment and Implementation - Troubleshooting - Design Patterns and Sample Architectures					
<b>TOTAL:</b>					<b>15 Hours</b>
<b>COURSE OUTCOMES:</b>					
At the end of this course, students will be able to, CO1: Understand the concept of AWS Architecture and Tools CO2: Apply Amazon EC2 tool to perform computer level operations CO3: Apply AWS Database Options tool to perform highly available options CO4: Create Cloud using Amazon VPC and Cloud Formation CO5: Apply security services to solve AWS services and Design Patterns					
<b>REFERENCES:</b>					

<ol style="list-style-type: none"> <li>1. <a href="https://aws.amazon.com">https://aws.amazon.com</a></li> <li>2. Getting Started with AWS - Kindle Edition, AWS Certified Solutions Architect Exam - 2017</li> <li>3. Joe Baron, Hisham Baz, Tim Bixler, Biff Gaut, Kevin E. Kelly “AWS Certified Solutions Architect Official Study Guide: Associate Exam”, Amazon Asia-Pacific Holdings Private Limited, 2016</li> <li>4. Zohaib Jabbar, “Practice Questions - AWS Certified Solutions Architect Exam, Kindle Edition, Amazon Asia-Pacific Holdings Private Limited, 2017</li> </ol>
---

<b>1704IT009</b>	<b>AGRICULTURE FOR ENGINEERS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>

**COURSE OBJECTIVES:**

In this course you will learn how the IT and ITeS are used in Agriculture field

**Project :**

The objective of the project work is to solve industrial (or society or research) problems by developing quality software solution. During the development of the project the students should involve in all the stages of the software development life cycle like requirements engineering, systems analysis, systems design, software development, testing strategies and documentation with an overall emphasis on the development of reliable software systems. The primary emphasis of the project work is to understand and gain the knowledge of how to plan, schedule, and monitor the software project. Topics selected should be complex and large enough to justify as a software project. The courses studied by the students during this courses provide them the comprehensive background to work on diverse application domains

**Suggested Areas:**

- IT Service Facility
- Weather/ Crop Forecasting
- e-Learning Specialist
- Knowledge Management
- Commodity Trader
- ERP systems
- Farm/Plantation Manager
- e-Commerce Portal
- Financial Analyst
- Supply Chain Management
- BPO services
- Crop Insurance
- e-Governance Portal

**TOTAL: 15 Hours**

**COURSE OUTCOMES:**

At the end of this course, students will able to create society related application for using agricultural field.

<b>1704IT010</b>	<b>MONGO AND MARIA DB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>

**AIM:** The main objective of this course is used to study and run Mongo and Maria DB and use execute more applications.

**COURSE OBJECTIVES:**

This course has been primarily designed for learners who have prior experience as a data analyst or data scientist.

**Mongo DB**

1. Connecting to Atlas and Analyzing Data with Aggregation
2. Cleansing Data with Updates and Querying for Documents on an Array Field
3. Improve Query Performance, Finding Things Nearby and Making Plots with Matplotlib & MongoDB

<b>Maria DB</b>	
<ol style="list-style-type: none"> <li>1. Software Instalation and Running – AMP, Client-Server Configurations</li> <li>2. Database Structure and Management</li> <li>3. Data Handling and Build in Functions</li> </ol>	
<b>TOTAL:</b>	<b>15 Hours</b>
<b>COURSE OUTCOMES:</b>	
At the end of this course, students will be able to,	
CO1: Solve database applications and analytics process using Mongo DB	
CO2: Solve database applications and analytics process using Maria DB	
<b>REFERENCES:</b>	
<ol style="list-style-type: none"> <li>1. <u>Kyle Banker</u>, MongoDB in Action Manning Publications; 1 edition, 2015</li> <li>2. <u>Kristina Chodorow</u>, “MongoDB: The Definitive Guide”, Shroff; Second edition, 2013</li> <li>3. <u>Rick Copeland</u>, “MongoDB Applied Design Patterns”, Shroff Publishers &amp; Distributers Private Limited - Mumbai; First edition, 2013</li> <li>4. <u>Daniel Bartholomew</u>, “Getting Started with MariaDB”, Packet Publishing,2013</li> <li>5. <u>Russell J. T. Dyer</u>, “Learning MySQL and MariaDB: Heading in the Right Direction with MySQL and MariaDB”, O'Reilly Media; 1 edition, 2015</li> <li>6. <a href="https://www.zeolearn.com">https://www.zeolearn.com</a></li> <li>7. <a href="https://www.mongodb.com">https://www.mongodb.com</a></li> </ol>	

<b>1704IT011</b>	<b>BUILDING SMART CITIES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>AIM:</b> The main objective of this course gives ideas about how to build smart cities using IT and ITes					
<b>COURSE OBJECTIVES:</b>					
The student should be made to:					
<ol style="list-style-type: none"> <li>1. Study and evaluate the Open Innovation process “The Smart City in the Making” in India.</li> <li>2. Capture the lessons currently being learned in India by the architects, engineers, business partners, investors, city managers, supply chains, the federal government and researchers.</li> <li>3. Evaluate Cost-Benefits of the investment – at a very high level.</li> <li>4. Based on your field analysis, recommend a framework for India for urban planning for better processes for soliciting external innovations to secure cost effective, designs, technologies, infrastructure and talent to benefit the building of future smart cities that are in the planning stages in India.</li> <li>5. Group Project: Study four Bay Area cities (one city per group) and propose a smart city model to each of the mayors. Develop at least one use case (i.e. Safety, Traffic, Energy Management etc.)</li> </ol>					
What is a Smart City?					
<ol style="list-style-type: none"> <li>1. Uses information technology to solve urban problems</li> <li>2. Why Study the Models in India? <ol style="list-style-type: none"> <li>a. Source of Frugal Innovations</li> <li>b. Commitment at the Top</li> <li>c. Learning from a Major Market</li> </ol> </li> <li>3. Final Group Project Deliverables: <ol style="list-style-type: none"> <li>1. Study and analyze city's annual budget and financial reports (study of past 10 year trend)</li> <li>2. Study of demographics, infrastructure, quality and quantitative factors impacting economic growth, consumption of resources, and the environment.</li> <li>3. Evaluation of the Revenue and Cost structure of the city.</li> <li>4. Sustainability study and evaluation of the city's current triple bottom line (economic, social and environmental)</li> <li>5. Recommendation of smart city initiatives to improve the triple bottom line based on best practices and anticipated technological advances.</li> <li>6. Recommendation for investment and payback analysis.</li> <li>7. Measurable CSR Initiatives.</li> <li>8. Recommendations of phase-in modules to work within the cities capital budget.</li> </ol> </li> </ol>					

9. Recommendation of explicit Open Innovation processes in creating, designing, building, planning and managing the cities to sustain themselves
<b>TOTAL: 15 Hours</b>
<b>COURSE OUTCOMES:</b>
At the end of this course, students will be able to, CO1: Understand the concept of smart cities, why these are still prototypes and what the challenges are. CO2: Identify the principle of stocks and flows of information in cities at different scales. CO3: Understand the concept of citizen design science and its importance for responsive cities. CO4: Understand the concept of complexity science in the context of architecture and city planning. CO5: Learn through citizen design science how you can interact and get involved in the planning of your own cities. CO6: Articulate what a responsive city is, and identify the criteria for a city to be responsive.
<b>REFERENCES:</b>
1. <u>Carol L. Stimmel</u> Building Smart Cities: Analytics, ICT, and Design Thinking Auerbach Publications; 1 edition, 2015 2. <u>Anthony M. Townsend</u> Smart Cities – Big Data, Civic Hackers, and the Quest for a New Utopia, W. W. Norton & Company; Reprint edition, 2014 3. <a href="https://www.edx.org">https://www.edx.org</a> and Online resources

<b>1704IT012</b>	<b>INDUSTRIAL SAFETY FOR ENGINEERS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>

**AIM:** The main objective of this course is used to give detailed view of industrial safety for IT engineers

**COURSE OBJECTIVES:**

The student should be made to:

1. Study and evaluate safety and measurement in industries
2. Learn Environmental, Health and Reliability in industries
3. Learn Computer Aided Hazards, Electrical Safety and Maintainability
4. Analysis and Study of Safety Measurement and Safety Awareness

1. Create a Safe Work Culture
2. Implement Fall Prevention Systems
3. Don't Choose Budget Over Safety
4. Hire the Right Contractors
5. Perform Preventative Maintenance
6. Encourage Communication
7. Keep the Workplace Clean
8. General Safety
9. Occupational Safety and Health
10. Process and Production Safety
11. Material Safety
12. Electrical Safety
13. Building and Usage Safety
14. Environmental Safety

**TOTAL: 15 Hours**

**COURSE OUTCOMES:**

At the end of this course, students will be able to,  
CO1: Understand the concept of safety and precaution methods  
CO2: Apply various safety techniques to work environment  
CO3: Explain various performance measurement methods  
CO4: Understand the concepts of health, material and electrical safety  
CO5: Apply environmental safety in working area

**REFERENCES:**

1. Genn, Adina. "Three Bills Would Expand OSHA Standards." Daily Record (Kansas City, MO). 13 February 2014.
2. Colling, David A. Industrial Safety: Management and Technology. Prentice Hall, 2015.
3. U.S. Department of Labor. Occupational Safety and Health Administration. OSHA's Small Business Outreach Training Program. Available

from <http://www.osha.gov/SLTC/smallbusiness/index.html> Retrieved on 14 March 2006.

4. Karr, Al. "Behavior-Based Safety: Is It the Holy Grail of the Workplace?" Safety and Health. March 2012.
5. Willen, Janet. "Safety Incentive Programs: Problem Solver or Troublemaker?" Safety and Health. September 2011.

1704IT013	INTRODUCTION TO FISHERIES ENGINEERING	L	T	P	C	
		0	0	0	1	
<b>COURSE OBJECTIVES:</b>						
This introductory unit provides the student with an understanding of the processes for managing commercial, recreational and traditional fisheries under the principles of Ecologically Sustainable Development (ESD). On the successful completion of this unit, students will be able to describe the status of fisheries in Australia and overseas, explain the need for fisheries management, identify fisheries management issues, outline the principles of fisheries management, describe the components of the fisheries management process and identify the criteria for effective fisheries management.						
<ol style="list-style-type: none"> <li>1. Evolution Regarding Fishing Technology and Equipment; the Effectiveness of an Individual Fishing Unit</li> <li>2. Fishery Biology and Inland Fisheries</li> <li>3. Marine Fisheries and Nautical Technology</li> <li>4. Fish processing technology</li> <li>5. Aquaculture, oceanography &amp; meteorology</li> <li>6. Fishing gear and craft and fishery economics</li> <li>7. Fisheries resource management and administration</li> <li>8. New Conditions for Fishing Operations; Context for the Development of Fishing Fleets; Opportunities</li> </ol>						
					<b>TOTAL:</b>	<b>15 Hours</b>
<b>COURSE OUTCOMES:</b>						
At the end of this course, students will be able to, CO1: Understand the concept of Evolution Fishing Technology CO2: Explain Fishery Biology and Inland Fisheries theory CO3: Apply fish processing technology in real time CO4: Understand the concepts of Fishing Gear, Craft and Economics CO5: Illustrate new conditions and operations of fishing techniques						
<b>REFERENCES:</b>						
<ol style="list-style-type: none"> <li>1. Anon. (2014) Fisheries Technologies for Developing Countries Report of an Ad Hoc Panel of the Board on Science and Technology for International Development; Office of International Affairs National Research Council</li> <li>2. FAO (2015) Definition and classification of fishing gear categories FAO Fisheries Technical Paper No 222 Rev.1 92 p.</li> <li>3. Cunningham S., Greboval D. (2013) Management of Fishing Capacity: A review of Policy and Technical Issues FAO Fisheries Technical Paper No 409 ; 60 p.</li> <li>4. Fyson J. (2010) Design of Small Fishing Vessels FAO/Fishing News Books 319 p. [A complete manual for the design and equipment of various types of fishing vessels]</li> <li>5. Fishing operations FAO (2010) Technical Guidelines for Fishing Operations FAO Technical Guidelines for Responsible Fisheries No 1. 126 p.</li> <li>6. Annex FAO (2012) Fishing Operations. 1. Vessel Monitoring Systems FAO Technical Guidelines for Responsible Fisheries. No. 1, Suppl. 1. 58 p.</li> <li>7. FAO Report of the Expert Consultation on Sustainable Fishing Technologies and Practices; St. John's Newfoundland, Canada, 2012</li> </ol>						

1704IT014	POLITICAL SCIENCE	L	T	P	C
		0	0	0	1
<b>AIM:</b> The main aim of this course is study of political science concepts and gives the ethics					
<b>COURSE OBJECTIVES:</b>					
This introductory unit provides the student with an understanding of the processes for managing commercial, recreational and traditional fisheries under the principles of Ecologically Sustainable Development (ESD). On the successful completion of this unit, students will be able to describe the status of fisheries in Australia and overseas, explain the need for fisheries management, identify fisheries management issues, outline the principles of fisheries management, describe the components of the fisheries management process and identify the criteria for effective fisheries management.					

<p><b>Political Theory and Indian Politics:</b> Theories of the State – Justice – Equality – Rights – Democracy - Concept of power, hegemony, ideology and legitimacy - Political Ideologies - Indian Political Thought - Western Political Thought</p> <p><b>Indian Government and Politics:</b> Indian Nationalism - Making of the Indian Constitution - Salient Features of the Indian Constitution - Grassroots Democracy - Statutory Institutions/Commissions – Federalism - Caste, Religion and Ethnicity in Indian Politics - Social Movements</p> <p><b>Comparative Politics and International Relations:</b> Comparative Politics - Politics of Representation and Participation - Key concepts in International Relations - Changing International Political Order - United Nations</p> <p><b>India and the World:</b> Indian Foreign Policy - India and South Asia - India’s Contribution to the Non-Alignment Movement - India and the Global South - India and the UN System - Recent developments in Indian Foreign policy</p>
<b>TOTAL: 15 Hours</b>
<b>COURSE OUTCOMES:</b>
At the end of this course, students will be able to, CO1: Understand political theory and Indian politics CO2: Explain Indian Government and Politics policies CO3: Compare politics and International relations CO4: Understand India and global developments
<b>REFERENCES:</b>
<ol style="list-style-type: none"> <li>1. <u>S.R. Myneni</u>, “Political Science”, ISBN-10: 9380231490, 2013</li> <li>2. <u>Upinder Singh</u>, “Political Violence in Ancient India”, Harvard University Press, 2017</li> <li>3. <u>S.R Myneni</u> and <u>sr myneni</u>, “Foundations of political obligation”, allahabad law agency; 2nd edition, 2015</li> <li>4. <u>Rao C.N. Shankar</u>, “Sociology of Indian Society”, S Chand; 2nd Rev. Edn. 2006 edition</li> <li>5. <u>Rao C.N. Shankar</u>, “Sociology: Principles of Sociology with an Introduction to Social Thoughts”, S Chand; 6th Rev. Edn. 2012</li> </ol>

<b>1704IT015</b>	<b>VISUAL COMMUNICATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>AIM:</b> The main aim of this course is study and applies visual communication techniques					
<b>COURSE OBJECTIVES:</b>					
This course will creates creativity and innovation to solve conceptual problems with necessary skills					
<ol style="list-style-type: none"> <li>1. Need and important of Human and Visual Communication, Communication as a process, Understanding Communication</li> <li>2. Communication as a process: Message, Meaning, Connotation and Denotation culture / code etc. Levels of communication: Technical, Semantic and pragmatic.</li> <li>3. Types of Media – Traditional media, Print media, Electronic media and new media.</li> <li>4. Basic of Graphic Design, Definition, Elements of Graphic Design. The process of developing ideas – Verbal, Visual, Combination and thematic, visual thinking, design execution and presentation.</li> <li>5. Definition, Origin &amp; Growth – Nature &amp; Scope of Advertising, roles of advertising, Social, Communication, Marketing &amp; Economic- functions of advertising.</li> <li>6. Based on target audience, geographic area, Media &amp; purpose. Corporate &amp; Promotional Advertising – Web Advertising.</li> <li>7. Conceptualization &amp; Ideation. Translation of ideas to campaigns, visualization designing &amp; layout, copy writing – types of headlines, body copy base lives, slogans. Logos &amp; trademarks.</li> <li>8. Printing, Publication and Photography</li> </ol>					
<b>TOTAL:</b>					<b>15 Hours</b>
<b>COURSE OUTCOMES:</b>					
At the end of this course, students will be able to, CO1: Understand the concepts of Visual Communications CO2: Explain various media and messaging techniques CO3: Apply Conceptualization and Ideas in visualization design and report					
<b>REFERENCES:</b>					
<ol style="list-style-type: none"> <li>1. Thoraval, Yves(2000) The Cinema of India(1896-2000)</li> <li>2. Dennis, E(2012). Lithographic technology in transition. Amdams, J.M.</li> <li>3. McAllister, R (2011) Pathways to Print: Trapping. Thomson Learning</li> <li>4. Mitchell Bearley &amp; John Hedgeese: New Introductory Photography Course, Read consumer Book Ltd, 2013</li> <li>5. Mohan: Advertising Management: Concepts &amp; Cases. Late McGraw – Hiss, 2012</li> </ol>					



6. Wood, Julia T: Communication mosaics: An introduction to the field of Communication, 2011,
7. Lester, E (2011) Visual Communication: Image with message, Wards worth. Larson, Charles, persuasion-  
Reception and responsibility Wards worth