



AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

(Approved by A.I.C.T.E., New Delhi & Permanently Affiliated to JNTU-GV, Vizianagaram)

NAAC “A+” Accredited Institute

Cherukupally (Village), Near Tagarapuvalasa Bridge, Vizianagaram (Dist), AP, Pin-531162.

www.aietta.ac.in, principal@aietta.ac.in

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Institute Vision:

To develop highly skilled professionals with strong ethical and human values.

Institute Mission:

M1: To impart quality education through effective teaching–learning practices, industrial exposure, and professional training.

M2: To produce competent and highly knowledgeable graduates with a positive attitude and problem-solving ability.

M3: To instill self-confidence, leadership qualities, and social responsibility to face professional and societal challenges.

Department Vision:

To emerge as a center of excellence in Computer Science and Engineering education and research, producing competent, industry-ready professionals with innovation, ethical values, and social responsibility.

Department Mission:

M1: To impart strong foundational knowledge in computer science, programming, and emerging technologies through effective teaching–learning practices.

M2: To develop problem-solving, analytical, and research skills by encouraging innovation, projects, and industry interaction.

M3: To produce industry-ready professionals with proficiency in modern tools, teamwork, and professional communication.

M4: To inculcate ethical values, social responsibility, and lifelong learning skills to meet professional and societal challenges.

Program Educational Objectives (PEOs):

PEO1: Graduates will apply strong foundations in computer science, mathematics, and engineering principles to analyze and solve real-world problems.

PEO2: Graduates will design, develop, and deploy software systems and applications using modern Engineering tools, technologies, and industry-standard practices.



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PEO3: Graduates will pursue successful careers in industry, entrepreneurship, higher education, or research through continuous learning and skill enhancement.

PEO4: Graduates will demonstrate professional ethics, effective communication, teamwork, and leadership while contributing responsibly to society.

Program Specific Outcomes (PSOs):

PSO1: Apply core computing concepts to design efficient software and systems.

PSO2: Use modern tools and emerging technologies to solve real-world problems ethically.

Program Outcomes (POs):

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)



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PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8).



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV B. Tech –I Semester						
S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	PE	Professional Elective-III 1.Cloud Computing 2.Neural Networks and Soft Computing 3.Ad-hoc and Sensor Networks 4.Cyber Security & Forensics	3	0	0	3
2	PE	Professional Elective-IV 1. Deep Learning Techniques 2. Social Networks & Semantic Web 3. Computer Vision 4.MOOCs-NPTEL/SWAYAM [%]	3	0	0	3
3	PE	Professional Elective-V 1.Block-Chain Technologies 2.Wireless Network Security 3.Ethical Hacking 4.MOOCs-NPTEL/SWAYAM [%]	3	0	0	3
4	Open Elective /Job Oriented	Open Elective-III Open Electives offered by other departments/ API and Microservices (Job Oriented Course)	3	0	0	3
5	Open Elective /Job Oriented	Open Elective-IV Open Electives offered by other departments/ Secure Coding Techniques (Job Oriented Course)	3	0	0	3
6	HS	Universal Human Values 2: Understanding Harmony	3	0	0	3
7	SO	1.PYTHON: Deep Learning OR 2.MEAN Stack Technologies-Module II- Angular JS and MongoDB OR 3.APSSDC offered Courses	0	0	4	2
8	PR	Industrial/Research Internship 2 months (Mandatory) after third year (to be evaluated during VII semester)	0	0	0	3
Total credits						23
11	Minor	Software Engineering ^{\$} / any other from PART-B (For Minor)	3	0	2	3+1
12	Honors	Any course from the Pool, as per the opted track	4	0	0	4
Minor course through SWAYAM			-	-	-	2

\$- Integrated Course

% - MOOC Course



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV B. Tech –II Semester						
S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	Project	Major Project Work, Seminar Internship	-	-	-	12
Total credits						12

Note:

1. **For integrated courses:** Theory and laboratory exams will be conducted separately, and the student concern will get credits if successfully completes both theory and laboratory. Only external exam will be conducted for Laboratory component. Credit based weightage shall be considered while awarding the grade.
2. **For MOOC courses:** Based on the students interest, student can register and complete a 12 week course one year in advance, by prior information to the concern.



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV Year – I Semester				
	L	T	P	C
	3	0	0	3
CLOUD COMPUTING (Professional Elective-III)				

Course Objectives:

- To explain the evolving computer model caned cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.
- To motivate students to do programming and experiment with the various cloud computing environments.

Course Outcomes: At the end of the course, student will be able to

- Illustrate the key dimensions of the challenge of Cloud Computing
- Classify the Levels of Virtualization and mechanism of tools.
- Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.
- Create Combinatorial Auctions for cloud resource and design scheduling algorithms for computing cloud
- Assess control storage systems and cloud security, the risks involved its impact and develop cloud application

UNIT I: Systems Modeling, Clustering and Virtualization: Scalable Computing over the Internet-The Age of Internet Computing, Scalable computing over the internet, Technologies for Network Based Systems, System models for Distributed and Cloud Computing, , Performance, Security and Energy Efficiency

UNIT II: Virtual Machines and Virtualization of Clusters and Data Centers: Implementation Levels of Virtualization, Virtualization Structures/ Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data-Center Automation.

UNIT III: Cloud Platform Architecture: Cloud Computing and Service Models, Public Cloud Platforms, Service Oriented Architecture, Programming on Amazon AWS and Microsoft Azure

UNIT IV: Cloud Resource Management and Scheduling: Policies and Mechanisms for Resource Management, Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds-Fair Queuing, Start Time Fair Queuing.

UNIT V: Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system.

Text Books:

1. Distributed and Cloud Computing, Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.

Reference Books:

1. Cloud Computing, A Hands on approach, ArshadeepBahga, Vijay Madiseti, University Press
2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
3. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH



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IV Year – I Semester				
	L	T	P	C
	3	0	0	3
NEURAL NETWORKS AND SOFT COMPUTING (Professional Elective-III)				

Course Objectives: The main objective of the course is

- To introduce the foundations of Artificial Neural Networks.
- To acquire the knowledge on Soft Computing Concepts.
- To learn various types of Genetic algorithms and its applications.
- To gain knowledge to apply optimization strategies.

Course Outcomes: At the end of the course, student will be able to

- Understand the concepts of Artificial intelligence and soft computing techniques
- Analyze the concepts of Neural Networks and select the Learning Networks in modeling real world systems.
- Implement the concepts of Fuzzy reasoning and concepts of Genetic algorithm and its applications to soft computing.
- Classify Biologically inspired algorithm such as neural networks, genetic algorithms, ant colony optimization, and bee colony optimization.
- Design hybrid system incorporating neural network, genetic algorithms, fuzzy systems.

UNIT I: Soft Computing and Artificial Intelligence: Introduction of Soft Computing, Soft Computing vs. Hard Computing, Various Types of Soft Computing Techniques, Applications of Soft Computing, AI Search Algorithm, Predicate Calculus, Rules of Inference, Semantic Networks, Frames, Objects, Hybrid Models.

UNIT II: Artificial Neural Networks and Paradigms: Introduction to Neuron Model, Neural Network Architecture, Learning Rules, Perceptrons, Single Layer Perceptrons, Multilayer Perceptrons, Back propagation Networks, Kohonen's self organizing networks, Hopfield network, Applications of NN.

UNIT III: Fuzzy Logic: Introduction, Fuzzy sets and Fuzzy reasoning, Basic functions on fuzzy sets, relations, rule based models and linguistic variables, fuzzy controls, Fuzzy decision making, applications of fuzzy logic.

UNIT IV: Genetic Algorithms and Swarm Optimizations: Introduction, Genetic Algorithm, Fitness Computations, Cross Over, Mutation, Evolutionary Programming, Classifier Systems, Genetic Programming Parse Trees, Variants of GA, Applications, Ant Colony Optimization, Particle Swarm Optimization, Artificial Bee Colony Optimization.

UNIT V: Hybrid Systems: Neuro fuzzy hybrid systems, Adaptive neuro fuzzy inference systems, Fuzzy backpropagation network, Genetic neuro hybrid system, Genetic algorithm based backpropagation network, Genetic-fuzzy hybrid systems.

Text Books:

1. Simon S. Haykin, Neural Networks, Prentice Hall, 2nd edition.
2. S. Rajasekaran & G. A. Vijayalakshmi Pai “Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications”, PHI, 2003.



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Reference Books:

1. S. N. Sivanandam & S. N. Deepa "Principles of Soft Computing" Wiley – India, 2nd Edition, 2007.
2. Jang J.S.R., Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", Prentice Hall, 1998.
3. Jacek M. Zurada, Introduction to Artificial Neural Systems, Jaico Publishing House, 1994
4. Zimmermann, "Fuzzy Set Theory and its Application", 3rd Edition.
5. D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y, 1989.
6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill, 3rd edition 2009.



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IV Year – I Semester				
	L	T	P	C
	3	0	0	3
AD-HOC AND SENSOR NETWORKS (Professional Elective-III)				

Course Objectives:

From the course the student will learn

- Architect sensor networks for various application setups.
- Devise appropriate data dissemination protocols and model links cost.
- Understanding of the fundamental concepts of wireless sensor networks and has a basic knowledge of the various protocols at various layers.
- Evaluate the performance of sensor networks and identify bottlenecks.

Course Outcomes: At the end of the course, student will be able to

- Evaluate the principles and characteristics of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.
- Determine the principles and characteristics of wireless sensor networks.
- Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc sensor networks.
- Illustrate the various sensor network Platforms, tools and applications.
- Demonstrate the issues and challenges in security provisioning and also familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs.

UNIT I: Introduction to Ad Hoc Wireless Networks- Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs, Ad Hoc Wireless Internet, MAC protocols for Ad hoc Wireless Networks-Issues, Design Goals and Classifications of the MAC Protocols.

UNIT II: Routing Protocols for Ad Hoc Wireless Networks- Issues in Designing a Routing Protocol, Classifications of Routing Protocols, Topology-based versus Position-based Approaches, Issues and design goals of a Transport layer protocol, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Solutions for TCP over Ad Hoc Wireless Networks, Other Transport layer protocols.

UNIT III: Security protocols for Ad hoc Wireless Networks- Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks, Cooperation in MANETs, Intrusion Detection Systems.

UNIT IV: Basics of Wireless Sensors and Applications- The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications, Data Retrieval in Sensor Networks-Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT V: Security in WSNs- Security in WSNs, Key Management in WSNs, Secure Data Aggregation in WSNs, Sensor Network Hardware-Components of Sensor Mote, Sensor Network Operating Systems– TinyOS, LA-TinyOS, SOS, RETOS, Imperative Language-nesC, **Dataflow Style Language**-TinyGALS, Node-Level Simulators, NS-2 and its sensor network extension, TOSSIM.



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Text Books:

1. Ad Hoc Wireless Networks – Architectures and Protocols, 1st edition, C. Siva Ram Murthy, B. S. Murthy, Pearson Education, 2004
2. Ad Hoc and Sensor Networks – Theory and Applications, 2nd edition *Carlos Corderio Dharma P. Aggarwal*, World Scientific Publications / Cambridge University Press, March 2006

Reference Books:

1. Wireless Sensor Networks: An Information Processing Approach, 1st edition, *Feng Zhao, Leonidas Guibas*, Elsevier Science imprint, Morgan Kauffman Publishers, 2005, rp2009
2. Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications, 1st edition, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008
3. Ad hoc Networking, 1st edition, *Charles E. Perkins*, Pearson Education, 2001
4. Wireless Ad hoc Networking, 1st edition, *Shih-Lin Wu, Yu-Chee Tseng*, Auerbach Publications, Taylor & Francis Group, 2007
5. Wireless Sensor Networks – Principles and Practice, 1st edition, Fei Hu, Xiaojun Cao, An Auerbach book, CRC Press, Taylor & Francis Group, 2010



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IV Year – I Semester				
	L	T	P	C
	3	0	0	3
CYBER SECURITY & FORENSICS (Professional Elective-III)				

Course Objectives:

The aim of the course is to

- identify security risks and take preventive steps
- understand the forensics fundamentals
- understand the evidence capturing process
- understand the preservation of digital evidence

Course Outcomes: At the end of the course, student will be able to

- Explain the Cybercrime Fundamentals
- Describe the types of attacks on networks
- Analyze various tools available for Cybercrime Investigation
- Explain the Computer Forensics and Investigation Fundamentals and tools
- Analyze the legal perspectives of Cybercrime

UNIT I: Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrime, Cyberstalking, Cybercafe and Cybercrimes, Botnets. Attack Vector, Proliferation of Mobile and Wireless Devices, Security Challenges Posed by Mobile Devices, Attacks on Mobile/Cell Phones, Network and Computer Attacks.

UNIT II: Tools and Methods : Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, Sniffers, Spoofing, Session Hijacking Buffer over flow, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Identity Theft (ID Theft), Foot Printing and Social Engineering, Port Scanning, Enumeration.

UNIT III: Cyber Crime Investigation: Introduction, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

UNIT IV: Computer Forensics and Investigations: Understanding Computer Forensics, Preparing for Computer Investigations. Current Computer Forensics Tools: Evaluating Computer Forensics Tools, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Graphics and Network Forensics, E-mail Investigations, Cell Phone and Mobile Device Forensics.

UNIT V: Cyber Crime Legal Perspectives: Introduction, Cybercrime and the Legal Landscape around the World, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyberlaw, Technology and Students: Indian Scenario.



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Text Books:

1. Sunit Belapure Nina Godbole “Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, WILEY, 2011.
2. Nelson Phillips and Enfinger Steuart, “Computer Forensics and Investigations”, Cengage Learning, New Delhi, 2009.

Reference Books:

1. Michael T. Simpson, Kent Backman and James E. Corley, “Hands on Ethical Hacking and Network Defence”, Cengage, 2019.
2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Alfred Basta, Nadine Basta, Mary Brown and Ravinder Kumar “Cyber Security and Cyber Laws”, Cengage, 2018.

E-Resources:

1. CERT-In Guidelines- <http://www.cert-in.org.in/>
2. <https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks> [Online Course]
3. <https://computersecurity.stanford.edu/free-online-videos> [Free Online Videos]
4. Nickolai Zeldovich. 6.858 Computer Systems Security. Fall 2014. Massachusetts Institute of Technology: MIT OpenCourseWare, <https://ocw.mit.edu> License: Creative Commons BY-NC-SA.



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IV Year – I Semester				
	L	T	P	C
	3	0	0	3
DEEP LEARNING TECHNIQUES (Professional Elective-IV)				

Course Objectives: The main objective of the course is to make students:

- Learn deep learning methods for working with sequential data,
- Learn deep recurrent and memory networks,
- Learn deep Turing machines,
- Apply such deep learning mechanisms to various learning problems.
- Know the open issues in deep learning, and have a grasp of the current research directions.

Course Outcomes: After the completion of the course, student will be able to

- Demonstrate the fundamental concepts learning techniques of Artificial Intelligence, Machine Learning and Deep Learning.
- Discuss the Neural Network training, various random models.
- Explain the Techniques of Keras, TensorFlow, Theano and CNTK
- Classify the Concepts of CNN and RNN
- Implement Interactive Applications of Deep Learning.

UNIT I:

Fundamentals of Deep Learning: Artificial Intelligence, History of Machine learning: Probabilistic Modeling, Early Neural Networks, Kernel Methods, Decision Trees, Random forests and Gradient Boosting Machines, **Fundamentals of Machine Learning:** Four Branches of Machine Learning, Evaluating Machine learning Models, Overfitting and Underfitting. **[Text Book 2]**

UNIT II: Introducing Deep Learning: Biological and Machine Vision, Human and Machine Language, Artificial Neural Networks, Training Deep Networks, Improving Deep Networks. **[Text Book3]**

UNIT III: Neural Networks: Anatomy of Neural Network, Introduction to Keras: Keras, TensorFlow, Theano and CNTK, Setting up Deep Learning Workstation, Classifying Movie Reviews: Binary Classification, Classifying newswires: Multiclass Classification. **[Text Book 2]**

UNIT IV:

Convolutional Neural Networks: Neural Network and Representation Learning, Convolutional Layers, Multichannel Convolution Operation, **Recurrent Neural Networks:** Introduction to RNN, RNN Code, PyTorch Tensors: Deep Learning with PyTorch, CNN in PyTorch. **[Text Book 3]**

UNIT V:

Interactive Applications of Deep Learning: Machine Vision, Natural Language processing, Generative Adversarial Networks, Deep Reinforcement Learning. **[Text Book 1]**

Deep Learning Research: Autoencoders, Deep Generative Models: Boltzmann Machines Restricted Boltzmann Machines, Deep Belief Networks. **[Text Book 1]**

Text Books:

1. Deep Learning- Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press, 2016
2. Deep Learning with Python - Francois Chollet, Released December 2017, Publisher(s): Manning Publications, ISBN: 9781617294433
3. Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence - Jon Krohn, Grant Beyleveld, Aglaé Bassens, Released September 2019, Publisher(s): Addison-Wesley Professional, ISBN: 9780135116821



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4. Deep Learning from Scratch - Seth Weidman, Released September 2019, Publisher(s): O'Reilly Media, Inc., ISBN: 9781492041412

Reference Books:

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
2. Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,2013.
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.

Web Link:

1. Swayam NPTEL: Deep Learning: https://onlinecourses.nptel.ac.in/noc22_cs22/preview



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IV Year – I Semester				
	L	T	P	C
	3	0	0	3
SOCIAL NETWORKS & SEMANTIC WEB (Professional Elective-IV)				

Course Objectives:

- To learn Web Intelligence
- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology
- To learn Social Network Analysis and semantic web

Course Outcomes: After the completion of the course, student will be able to

- Demonstrate social network analysis and measures.
- Analyze random graph models and navigate social networks data
- Apply the network topology and Visualization tools.
- Analyze the experiment with small world models and clustering models.
- Compare the application driven virtual communities from social network Structure.

UNIT I: Web Intelligence: Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT II: Knowledge Representation for the Semantic Web: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT III: Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT IV: Semantic Web Applications, Services and Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT V: Social Network Analysis and semantic web: What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

Text Books:

1. Thinking on the Web – Berners Lee, Godel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.



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Reference Books:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, R. Studer, P. Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD.



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IV Year – I Semester				
	L	T	P	C
	3	0	0	3
COMPUTER VISION (Professional Elective-IV)				

Course Objectives:

To introduce students the fundamentals of image formation; To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition; To develop an appreciation for various issues in the design of computer vision and object recognition systems; and To provide the student with programming experience from implementing computer vision and object recognition applications.

Course Outcomes: After completing the course Student will be able to:

1. Identify basic concepts, terminology, theories, models and methods in the field of computer vision,
2. Describe known principles of feature detection and matching,
3. Describe basic methods of computer vision related to image stitching, photography like high dynamic range imaging and blur removal.
4. Suggest a design of a computer vision system for a 3D Reconstruction, Albedos, image based rendering views and depths.

UNIT I: Introduction: Image Formation: Geometric Primitives and Transformation, Photometric Image Formation, Digital Camera, Image Processing: Point Operators, Linear Filtering, More Neighborhood Operators, Fourier Transforms, Pyramids and Wavelets, Geometric Transformations, Global Optimization.

UNIT II: Feature Detection and Matching: Points and Patches, Edges, Lines, Segmentation: Active Contours, Split and Merge, Mean Shift and Mode Finding, Normalized Cuts, Feature-Based Alignment: 2D and 3D Feature-based Alignment, Pose Estimation, Geometric Intrinsic Calibration.

UNIT III: Structure and Motion: Triangular, Two-frame Structure from Motion, Factorization, Bundle Adjustment, Constrained Structure and Motion, Dense Motion Estimation: Translation Alignment, Parametric Motion, Spline-based Motion, Optical Flow, Layered motion

UNIT IV: Image Stitching: Motion Models, Global Alignment, Composing, Computational Photography: Photometric Calibration, High Dynamic Range Imaging, Super-Resolution and Blur Removal, image Matting and Compositing, Texture Analysis and Synthesis.

UNIT V: 3D Reconstruction: Shape From X, Active Range Finding, Surface Representation, Point-based Representation, Volumetric Representation, Model-based Reconstruction, Recovering Texture Maps and Albedos, Image- based Rendering: View Interpolation, Layered Depth Images, Light Fields and Lumigraphs, Environment Mattes, Video-based Rendering.

Text Books:

1. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited, 2011.
2. Simon J.D Prince, Computer Vision: Models, Learning and Inference, 1st Edition, 2012.

Reference Books:

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Haralick & Shapiro, "Computer and Robot Vision", Vol II
3. Gerard Medioni and Sing Bing Kang "Emerging topics in computer vision" 166

NPTEL LINK: https://onlinecourses.nptel.ac.in/noc22_ee48/preview



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV Year – I Semester				
	L	T	P	C
	3	0	0	3
BLOCK-CHAIN TECHNOLOGIES (Professional Elective-V)				

Course Objectives:

To understand block chain technology and Cryptocurrency works

Course Outcomes:

After the completion of the course, student will be able to

- Demonstrate the block chain basics, Crypto currency
- To compare and contrast the use of different private vs. public block chain and use cases
- Design an innovative Bit coin Block chain and scripts, Block chain Science on varies coins
- Classify Permission Block chain and use cases – Hyper ledger, Corda
- Make Use of Block-chain in E-Governance, Land Registration, Medical Information Systems and others

UNIT I: Introduction: Introduction, basic ideas behind block chain, how it is changing the landscape of digitalization, introduction to cryptographic concepts required, Block chain or distributed trust, Currency, Cryptocurrency, How a Cryptocurrency works, Financial services, Bitcoin prediction markets.

UNIT II: Hashing, public key cryptosystems, private vs public block chain and use cases, Hash Puzzles, Extensibility of Block chain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Block chain Environment

UNIT III: Introduction to Bitcoin : Bitcoin Block chain and scripts, Use cases of Bitcoin Blockchain scripting language in micropayment, escrow etc Downside of Bit coin mining, Block chain Science: Grid coin, Folding coin, Block chain Genomics, Bit coin MOOCs.

UNIT IV: Ethereum continued, IOTA, The real need for mining, consensus, Byzantine Generals Problem, and Consensus as a distributed coordination problem, Coming to private or permissioned block chains, Introduction to Hyper ledger, Currency, Token, Campus coin, Coin drop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency

UNIT V: Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations, Uses of Block chain in E-Governance, Land Registration, Medical Information Systems.

Text Books:

1. Blockchain Blue print for Economy by Melanie Swan

Reference Books:

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV Year – I Semester				
	L	T	P	C
	3	0	0	3
WIRELESS NETWORK SECURITY (Professional Elective-V)				

Course Objectives:

The objective of this course is to understand the importance of Wireless networks security and its application

Course Outcomes: After the completion of the course, student will be able to

- Explain the Threats in networks and provide Authentication to real time problems.
- Identify and investigate in-depth both early and contemporary threats to wireless networks security
- Ability to analyze and determine for any organization the database security requirements and appropriate solutions
- Determined IP Security Issues and solve real time problems.
- Build wireless Development Strategies in real time issues

UNIT I: Introduction to Wireless: History of Wireless Technologies, History of Wireless Security, State of the Wireless Security Industry, 2001 **Wireless Threats:** Uncontrolled Terrain, Communications Jamming, DoS Jamming, Injections and Modifications of Data, Man-in-the-Middle (MITM) Attack, Rogue Client, Rogue Network Access Points, Attacker Equipment,

UNIT II: Introduction to Wireless Security Protocols and Cryptography: Recovery the FUD, OSI Model, OSI Simplified, Internet Model, Wireless LAN Security Protocols, Cryptography, SSL/TLS, Secure Shell Protocols, Terminal Access and File Transfer, Port Forwarding a Word of Caution, Man-in-the-Middle of SSL/TLS and SSH, WTLS, WEP, 802.1x, IP Security

UNIT III:

Security Considerations to Wireless Devices: Wireless Device Security Issues, Physical Security, Information Leakage, Device Security Features, Application Security, Detailed Device Analysis, Laptops, Personal Digital Assistants (PDAs), Wireless Infrastructure **Wireless Technologies and Applications:** Introduction to Cellular Networks- FDMA, TDMA, CDMA, Spread Spectrum Primer, Analogy, TDMA Vs CDMA, PDC, Security Threats

UNIT IV:

Introduction to Wireless Data Networks: Cellular Digital Packet Data (CDPD), CDPD Architecture, CDPD Security, Mobitex- Mobitex Architecture, Mobitex Security Architecture, Security Issues, Gateway, Security Model **Wireless Standards and Technologies:** Current and Future Technologies- Infrared, Radio, Spread Spectrum, OFDM, Current and Future Standards- IEEE 802 Standards, ETSI, Home RF, Ultra-wide band Radio (UWB)

UNIT V: Wireless Deployment Strategies: Implementing Wireless LAN's- Security Considerations Common Wireless Network Applications, Enterprise Campus Designs, Wireless IST Design, Retail and Manufacturing Design, Small Office/Home Office Design (SOHO)

Text Books:

1. Wireless Security, Merritt Maxim and David Pollino, Osborne/McGraw Hill, New Delhi, 2005
2. Wireless Security Models: Threats and Solutions, Nichols and Lekka, Tata McGraw Hill, New Delhi 2006



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Reference Books:

1. Behrouz A. Forouzan, —Cryptography & Network Security, Tata McGraw Hill, India, New Delhi, 2009
2. William Stallings, —Cryptography and Network Security, Prentice Hall, New Delhi, 2006
3. Bruce Schneier, “Applied Cryptography”, John Wiley & Sons, New York, 2004



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV Year – I Semester				
	L	T	P	C
	3	0	0	3
ETHICAL HACKING (Professional Elective-V)				

Course Objectives:

- The aim of the course is to introduce the methodologies and framework of ethical hacking for enhancing the security.
- The course includes-Impacts of Hacking; Types of Hackers; Information Security Models, Information Security Program, Business Perspective, Planning a Controlled Attack
- Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration)

Course Outcomes: At the end of the course, student will be able to

- Explain the concepts related to hacking, ports and protocols, pen testing and virtualization
- Determine the applicable footprinting techniques and scanning methods
- Explain the process of system hacking and Explain the concepts Trojans, backdoors, worms and virus and it's countermeasures
- Demonstrate systematic understanding of the concepts of Sniffing and Social Engineering and it's attacks
- Determine the applicable methods of cryptography, steganography and Vulnerability Assessment

UNIT I:

Introduction to Hacking: Hacking, Types and phases of hacking, **Introduction to Ports & Protocols:** Ports, Protocols, Primary Network Types, **Virtualization & Introduction to Kali Linux:** Virtualization, Virtualization software, supported platforms, **Introduction to Penetration Testing:** Penetration test, Categories and Types of Penetration tests, Structure of Penetration Test Report.

UNIT II:

Footprinting: Footprinting, Types, Using ping and ns Lookup commands in Windows command line, **Scanning:** Scanning, Basics of Scanning, Basic Techniques of Scanning, Enumerating DNS using dns enum, Performing flag scan using hping3.

UNIT III:

Hacking into System: System Hacking, Password Cracking, Default password databases, Manual and Automated Password Cracking, Process of System Hacking, Using Keyloggers, **Trojans & Backdoors:** Trojans, Working of Trojan, Infection Techniques, Attack, Lifecycle and Classification of Virus, Worms, Virus Construction Kit.

UNIT IV:

Sniffing, Packet Analysis & Session Hijacking: Sniffing, Packet Analysis, Types of Sniffing, Active and Passive Sniffing Techniques, Session Hijacking, **Social Engineering:** Social Engineering, Process, Identity Theft, Human and Computer Based Social Engineering Techniques, Phishing Process, Types of Phishing Attacks, Social Engineering Toolkit (SET)

UNIT V:

Cryptography: Cryptography, Digital Signature, Hash Functions, **Steganography:** Steganography Process, watermarking, Steganography Methods and Attacks, Steganography tools, **Vulnerability Assessment:** Vulnerability, The Open Web Application Security Project (OWASP), Prevention, Damn Vulnerable Web Application (DVWA), installation and testing of DVWA



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Text Books:

1. Hacking: Be a Hacker with Ethics, Harsh Bothra, Khanna Publications, 2019
2. Ethical Hacking and Penetration Testing Guide, Rafay Baloch, 2014

Reference Books:

1. Kali Linux Wireless Penetration Testing Beginner's Guide, Vivek Ramachandran, Cameron Buchanan, Packt Publishing, 2015
2. SQL Injection Attacks and Defense, 1st Edition, Justin Clarke-Salt, Syngress Publication
3. Mastering Modern Web Penetration Testing, Prakhar Prasad, Packt Publishing, October 2016



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV Year – I Semester				
	L	T	P	C
	3	0	0	3
API AND MICROSERVICES (Job Oriented Course)				

Course Outcomes:

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

- Develop a Spring Data JPA application with Spring Boot
- Implement CRUD operations using Spring Data JPA
- Implement pagination and sorting mechanism using Spring Data JPA
- Implement query methods for querying the database using Spring Data JPA
- Implement a custom repository to customize a querying mechanism using Spring Data JPA
- Understand update operation using query approaches in Spring Data JPA
- Implement Spring Transaction using Spring Data JPA
- Develop RESTful endpoints using Spring REST Processing URI parameters
- Write RESTful services using Spring REST that consumes and produces data in different formats
- Handle exceptions and errors in Spring REST endpoints
- Write Spring based REST clients to consume RESTful services programmatically
- Create secure RESTful endpoints using Spring Security Document and version the Spring REST endpoints Implement CORS in a Spring REST application

UNIT I:

Spring 5 Basics : Why Spring, What is Spring Framework, Spring Framework - Modules, Configuring IoC container using Java-based configuration, Introduction To Dependency Injection, Constructor Injection, Setter Injection, What is AutoScanning

UNIT II:

Spring Boot: Creating a Spring Boot Application, Spring Boot Application Annotation, What is Autowiring , Scope of a bean, Logger, Introduction to Spring AOP, Implementing AOP advices, Best Practices : Spring Boot Application

UNIT III:

Spring Data JPA with Boot: Limitations of JDBC API, Why Spring Data JPA, Spring Data JPA with Spring Boot, Spring Data JPA Configuration, Pagination and Sorting, Query Approaches, Named Queries and Query, Why Spring Transaction, Spring Declarative Transaction, Update Operation in Spring Data JPA, Custom Repository Implementation, Best Practices - Spring Data JPA

UNIT IV:

Web Services: Why Web services, SOA - Service Oriented Architecture, What are Web Services, Types of Web Services, SOAP based Web Services, RESTful Web Services, How to create RESTful Services

UNIT V:

Spring REST: Spring REST - An Introduction, Creating a Spring REST Controller, @RequestBody and ResponseEntity, Parameter Injection, Usage of @PathVariable, @RequestParam and @MatrixVariable, Exception Handling, Data Validation, Creating a REST Client, Versioning a Spring REST endpoint, Enabling CORS in Spring REST, Securing Spring REST endpoints

Hardware and software configuration

- 4 or 8 GB RAM/126 GB ROM
- Swagger tool suite(opensource)
- OpenJDK 17 or Java 11,Maven 3.2 or above and MySQL 8.0 or above, Spring Tool suite, Postman



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Text Books:

1. Spring in action, 5th Edition, Author: Craig Walls, Ryan Breidenbach, Manning books

Web Links [Courses mapped to Infosys Springboard platform]:

Infosys Springboard courses:

1. https://infyspringboard.onwingspan.com/en/app/toc/lex_auth_01296689056211763272_shared/overview [Spring 5 Basics with Spring Boot]
2. https://infyspringboard.onwingspan.com/en/app/toc/lex_auth_4313461831752789500_shared/overview [Spring Data JPA with Boot]
3. https://infyspringboard.onwingspan.com/en/app/toc/lex_auth_012731900963905536190_shared/overview [Spring REST]

Web references:

1. Dependency Injection in spring - javatpoint
2. Autowiring in Spring - javatpoint
3. https://docs.spring.io/spring-boot/docs/2.0.x/reference/html/using-boot-using-springbootapplication-annotation.html
4. Autowiring in Spring - javatpoint , https://www.baeldung.com/spring-bean-scopes
5. Spring Boot Logging How does logging works in spring boot with example (educba.com)
6. Spring AOP Tutorial Aspect Oriented Programming - javatpoint
7. Spring Boot Best Practices (javaguides.net)
8. Introduction to Spring Data JPA SpringHow
9. https://asbnotebook.com/spring-data-jpa-crud-example/ , https://www.bezkoder.com/spring-boot-jpa-crud-rest-api/
10. Pagination and Sorting using Spring Data JPA - PagingAndSortingRepository (javaguides.net)
11. https://www.javaguides.net/2018/11/spring-data-jpa-query-creation-from-method-names.html , https://www.javaguides.net/2022/02/spring-data-jpa-namedqueries-example.html
12. https://javadeveloperzone.com/spring/spring-declarative-transaction-management/
13. https://javadeveloperzone.com/spring/spring-declarative-transaction-management/
14. https://javabeat.net/spring-data-custom-repository/
15. https://www.jrebel.com/blog/jpa-application-performance-best-practices
16. https://www.javatpoint.com/service-oriented-architecture , https://www.javatpoint.com/web-services-tutorial
17. https://www.javatpoint.com/soap-web-services , https://www.javatpoint.com/restful-web-services
18. RESTful Web Services - javatpoint
19. https://www.javatpoint.com/restful-web-services-spring-boot
20. https://www.javatpoint.com/restful-web-services-spring-boot , https://dzone.com/articles/lifecycle-of-a-request-response-process-for-a-spr
21. https://www.ibm.com/docs/en/was/8.5.5?topic=applications-defining-uri-patterns-resources-in-restful
22. https://www.baeldung.com/exception-handling-for-rest-with-spring
23. https://howtodoinjava.com/spring-boot2/resttemplate/spring-restful-client-resttemplate-example/
24. https://www.javatpoint.com/restful-web-services-versioning



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25. https://spring.io/guides/gs/rest-service-cors/
26. https://www.javatpoint.com/restful-web-services-basic-authentication-with-spring-security
27. https://www.springboottutorial.com/rest-api-best-practices-with-java-and-spring



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV Year – I Semester				
	L	T	P	C
	3	0	0	3
SECURE CODING TECHNIQUES (Job Oriented Course)				

Course Outcomes:

At the end of the Course, student will be able to:

- Differentiate the objectives of information security
- Understand the trend, reasons and impact of the recent Cyber attacks
- Understand OWASP design principles while designing a web application
- Understand Threat modelling
- Importance of security in all phases of SDLC
- Write secure coding using some of the practices in C/C++/Java and Python programming languages

UNIT I:

Network and Information security Fundamentals: Network Basics, Network Components, Network Types, Network Communication Types, Introduction to Networking Models, Cyber Security Objectives and Services, Other Terms of Cyber Security, Myths Around Cyber Security, Myths Around Cyber Security, Recent Cyber Attacks, Generic Conclusion about Attacks, Why and What is Cyber Security, Categories of Attack

UNIT II:

Introduction to Cyber security: Introduction to OWASP Top 10, A1 Injection, A1 Injection Risks Root Causes and its Mitigation, A1 Injection, A2 Broken Authentication and Session Management, A7 Cross Site Scripting XSS, A3 Sensitive Data Exposure, A5 Broken Access Control, A4 XML External Entity (XEE), A6 Security Misconfiguration, A7 Missing Function Level Access Control, A8 Cross Site Request Forgery CSRF, A8 Insecure Deserialization, A9 Using Components With Known Vulnerabilities, A10 Unvalidated Redirects and Forwards, A10 Insufficient Logging and Monitoring, Secure Coding Practices, Secure Design Principles, Threat Modeling, Microsoft SDL Tool

UNIT III:

Secure coding practices and OWASP Top 10: Declarative Security, Programmatic Security, Concurrency, Configuration, Cryptography, Input and Output Sanitization, Error Handling, Input Validation, Logging and auditing, Session Management, Exception Management, Safe APIs, Type Safety, Memory Management, Tokenizing, Sandboxing, Static and dynamic testing, vulnerability scanning and penetration testing

UNIT IV:

Secure coding practices in C/C++ and Java: Potential Software Risks in C/C++, Defensive coding, Preventative Planning, Clean Code, Iterative Design, Assertions, Pre Post Conditions, Low level design inspections, Unit Tests

Java- Managing Denial of Service, Securing Information, Data Integrity, Accessibility and Extensibility, Securing Objects, Serialization Security

UNIT V:

Secure coding in Python: Interactive Python Scripting, Python Variables, Conditionals, Loops, Functions, External Modules, File operations, Web requests



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Text Books:

1. Networking Fundamentals, 2019 edition, Packt, Author: Gordon Davies
2. Principles of Information Security, Authors: Michael E. Whitman and Herbert J. Mattord, Course technology incorp.
3. CSSLP SECURE SOFTWARE LIFECYCLE PROFESSIONAL ALL-IN-ONE EXAM GUIDE, Third Edition, 3rd Edition, Authors: Wm. Arthur Conklin, Daniel Paul Shoemaker, Released February 2022, Publisher(s): McGraw-Hill, ISBN: 9781264258215
4. OCP Oracle Certified Professional Java SE 11 Programmer II Study Guide: Exam 1Z0-816 and Exam 1Z0-817 Paperback – 6 August 2020, Authors: Scott Selikoff, Jeanne Boyarsky
5. OWASP 2017 Handbook,

https://owasp.org/www-pdf-archive/OWASP_Top_10_2017_RC2_Final.pdf

Web Links:

Infosys Springboard courses

1. https://infyspringboard.onwingspan.com/en/app/toc/lex_auth_012683751296065536354_shared/contents [Network Fundamentals]
2. https://infyspringboard.onwingspan.com/en/app/toc/lex_3388902307073574000_shared/overview [Introduction to cybersecurity]
3. https://infyspringboard.onwingspan.com/en/viewer/html/lex_auth_0135015696571596809160 [Certified Secure Software Lifecycle Professional (CSSLP) 2019: Secure Coding Practices]
4. https://infyspringboard.onwingspan.com/en/viewer/html/lex_auth_0135015689927557129660 [OWASP Top 10: Web Application Security]
5. https://infyspringboard.onwingspan.com/en/viewer/html/lex_auth_01350159304097792013093 [Defensive coding fundamentals in C and C++]
6. https://infyspringboard.onwingspan.com/en/viewer/html/lex_auth_01350159172969267213125 [Java SE 11 Programmer II: Secure Coding in Java SE 11 Applications]
7. https://infyspringboard.onwingspan.com/en/app/toc/lex_auth_01350158164493107211192/overview [Security Programming: Python Scripting Essentials]

Web references:

1. <https://www.stealthlabs.com/blog/infographic-top-15-cybersecurity-myths-vs-reality/>
2. <https://microage.ca/cybersecurity-layering-approach/>
3. <https://www.synopsys.com/glossary/what-is-threat-modeling.html#:~:text=Threat%20modeling%20is%20a%20structured,An%20abstraction%20of%20the%20system>
4. <https://www.microsoft.com/en-us/securityengineering/sdl/threatmodeling>
5. <https://www.checkpoint.com/cyber-hub/threat-prevention/what-is-sandboxing/>
6. <https://www.skillsoft.com/course/defensive-coding-fundamentals-for-cc-f44c02f9-1bcc-11e7-b15b-0242c0a80b07#:~:text=Defensive%20Programming%20is%20a%20methodology,%2C%20testing%2C%20and%20input%20validation>
7. <https://www.oracle.com/java/technologies/javase/seccodeguide.html>
8. <https://www.skillsoft.com/course/security-programming-python-scripting-essentials-be99adad-1f65-47a8-a4b5-6b5346072b8e>



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV Year – I Semester				
	L	T	P	C
	3	0	0	3
UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY				

Human Values Courses

This course also discusses their role in their family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course named as “H-102 Universal Human Values 2: Understanding Harmony” is designed which may be covered in their III or IV semester. During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.

Universal Human Values 2: Understanding Harmony

Course code: HSMC (H-102)

Credits: L-T-P-C 2-1-0-3 or 2L:1T:0P 3 credits

Pre-requisites: None. Universal Human Values 1 (desirable)

1. Objective:

The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

2. Course Topics:

The course has 28 lectures and 14 practice sessions in 5 modules:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration—what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than arbitrariness in choice based on liking-disliking

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

4. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
5. Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility
6. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
7. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
8. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
9. Programs to ensure Sanyam and Health.



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Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Module 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

10. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
11. Understanding the meaning of Trust; Difference between intention and competence
12. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
13. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
14. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
21. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people- friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
28. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

3. READINGS:

3.1 Text Book

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010



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3.2 Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

4. MODE OF CONDUCT (L-T-P-C 2-1-0-3 or 2L:1T:0P 3 credits)

Lectures hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analysing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the student explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration. Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses.

This course is to be taught by faculty from every teaching department, including HSS faculty. Teacher preparation with a minimum exposure to at least one 8-day FDP on Universal Human Values is deemed essential.

5. ASSESSMENT:

This is a compulsory credit course. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation. Example:

Assessment by faculty mentor: 10 marks

Self-assessment: 10 marks

Assessment by peers: 10 marks

Socially relevant project/Group Activities/Assignments: 20 marks

Semester End Examination: 50 marks



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The overall pass percentage is 40%. In case the student fails, he/she must repeat the course.

6. OUTCOME OF THE COURSE:

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

This is only an introductory foundational input. It would be desirable to follow it up by

- a) faculty-student or mentor-mentee programs throughout their time with the institution
- b) Higher level courses on human values in every aspect of living. E.g. as a professional



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	L	T	P	C
	0	0	4	2
PYTHON: DEEP LEARNING (Skill Oriented Course)				

Course Outcomes:

At the end of the Course, Student will be able to:

- Demonstrate the basic concepts fundamental learning techniques and layers.
- Discuss the Neural Network training, various random models.
- Apply various optimization algorithms to comprehend different activation functions to understand hyper parameter tuning
- Build a convolutional neural network, and understand its application to build a recurrent neural network, and understand its usage to comprehend auto encoders to briefly explain transfer learning

Pre-requisite knowledge :

- Exploratory data analysis: Collecting, importing, pre-processing, organizing, exploring, analyzing data and deriving insights from data
https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012666909428129792728_shared/overview
- Data visualization using Python: Data visualization functions and plots
https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0126051913436938241455_share_d/overview
- Regression analysis: Regression, types, linear, polynomial, multiple linear, Generalized linear regression models
https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01320408013336576065_shared/overview
- Clustering using Python: Clustering, techniques, Assessment and evaluation
https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0130441799423426561190_share_d/overview
- Machine learning using Python: Machine learning fundamentals, Regression, classification, clustering, introduction to artificial neural networks
https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012600400790749184237_shared/overview
- Time series analysis : Patterns, decomposition models, smoothing time, forecasting data
https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0126051804744253441280_share_d/overview

List of Exercises:

Note: There are online courses indicated in the reference links section. Learners need to go through the contents in order to perform the given exercises

Exercise 1:

Course name : .Build a Convolution Neural Network for Image Recognition.

Go through the modules of the course mentioned and answer the self-assessment questions given in the link below at the end of the course.

[Self Assessment - Deep Learning - Viewer Page | Infosys Springboard \(onwingspan.com\)](#)



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Exercise 2:

Module name : Understanding and Using ANN : Identifying age group of an actor
Exercise : Design Artificial Neural Networks for Identifying and Classifying an actor using Kaggle Dataset.
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_012776492416663552259_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course

Exercise 3:

Module name : Understanding and Using CNN : Image recognition
Exercise: Design a CNN for Image Recognition which includes hyperparameter tuning.
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_012785694443167744910_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course

Exercise 4:

Module name : Predicting Sequential Data
Exercise: Implement a Recurrence Neural Network for Predicting Sequential Data.
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_01279144948849868822_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course

Exercise 5:

Module Name: Removing noise from the images
Exercise: Implement Multi-Layer Perceptron algorithm for Image denoising hyperparameter tuning.
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_012792058258817024272_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course

Exercise 6:

Module Name: Advanced Deep Learning Architectures
Exercise: Implement Object Detection Using YOLO.
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_013102923373297664873_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course

Exercise 7:

Module Name: Optimization of Training in Deep Learning
Exercise Name: Design a Deep learning Network for Robust Bi-Tempered Logistic Loss.
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_013107917226680320184_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course

Exercise 8:

Module name: Advanced CNN
Exercise: Build AlexNet using Advanced CNN.
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_013111844422541312984_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course



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Exercise 9:

Module name: Autoencoders Advanced
Exercise: Demonstration of Application of Autoencoders.
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_0131164551289896962081_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course

Exercise 10 :

Module name: Advanced GANs
Exercise: Demonstration of GAN.
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_0131155456664289281901_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course

Exercise 11:

Module name : Capstone project
Exercise : Complete the requirements given in capstone project
Description: In this capstone, learners will apply their deep learning knowledge and expertise to a real world challenge.
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_013119291805696000651_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course

Exercise 12:

Module name : Capstone project
Exercise : Complete the requirements given in capstone project
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_013119291805696000651_shared?collectionId=lex_auth_01274814254931148859_shared&collectionType=Course

Reference Books:

1. Goodfellow, I., Bengio, Y., and Courville, A., Deep Learning, MIT Press, 2016.
2. Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.
3. Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.

Hardware and software configuration:

Experimental Environment	Configuration Instructions	
Hardware Environment	CPU	Intel® Core™ i7-6700 CPU 4GHz
	GPU	Nvidia GTX 750, 4GB
	Memory	8 GB
Software Environment	Operating System	Ubuntu 14.04, 64 bit
	Programming Environment	Tensorflow deep learning framework and Python language

Web Links: [Courses mapped to Infosys Springboard platform]

1. https://infyspringboard.onwingspan.com/en/app/toc/lex_auth_012782105116811264219_shared/contents [Introduction to Deep Learning]
2. https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_013119291805696000651_shared [Deep learning for Developers]



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MEAN STACK TECHNOLOGIES-MODULE II- ANGULAR JS, MONGODB (Skill Oriented Course)					

Course Outcomes:

- Build a component-based application using Angular components and enhance their functionality using directives.
- Utilize data binding for developing Angular forms and bind them with model data.
- Apply Angular built-in or custom pipes to format the rendered data.
- Develop a single page applic
- ation by using synchronous or asynchronous Angular routing.
- Make use of MongoDB queries to perform CRUD operations on document database.

List of Exercises:

1.a	Course Name: Angular JS
	Module Name: Angular Application Setup
	Observe the link http://localhost:4200/welcome on which the mCart application is running. Perform the below activities to understand the features of the application.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_24049616594198490000_shared?collectionId=lex_20858515543254600000_shared&collectionType=Course
1.b	Course Name: Angular JS
	Module Name: Components and Modules
	Create a new component called hello and render Hello Angular on the page
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_28217843279641040000_shared?collectionId=lex_20858515543254600000_shared&collectionType=Course
1.c	Course Name: Angular JS
	Module Name: Elements of Template
	Add an event to the hello component template and when it is clicked, it should change the courseName.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_19226434057992030000_shared?collectionId=lex_20858515543254600000_shared&collectionType=Course
1.d	Course Name: Angular JS
	Module Name: Change Detection
	progressively building the PoolCarz application
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_25609816371207710000_shared?collectionId=lex_208585155432546000000_shared&collectionType=Course
2.a	Course Name: Angular JS
	Module Name: Structural Directives - ngIf
	Create a login form with username and password fields. If the user enters the correct credentials, it should render a "Welcome <<username>>" message otherwise it should render "Invalid Login!!! Please try again..." message
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_0127637402260439042595_shared?collectionId=lex_208585155432546000000_shared&collectionType=Course



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2.b	Course Name: Angular JS
	Module Name: ngFor
	Create a courses array and rendering it in the template using ngFor directive in a list format.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_32795774277593590000_shared?collectionId=lex_208585155432546000_00_shared&collectionType=Course
2.c	Course Name: Angular JS
	Module Name: ngSwitch
	Display the correct option based on the value passed to ngSwitch directive.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_23388127475984175000_shared?collectionId=lex_208585155432546000_00_shared&collectionType=Course
2.d	Course Name: Angular JS
	Module Name: Custom Structural Directive
	Create a custom structural directive called 'repeat' which should repeat the element given a number of times.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_24073319904331424000_shared?collectionId=lex_208585155432546000_00_shared&collectionType=Course
3.a	Course Name: Angular JS
	Module Name: Attribute Directives - ngStyle
	Apply multiple CSS properties to a paragraph in a component using ngStyle.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_24037156998765367000_shared?collectionId=lex_208585155432546000_00_shared&collectionType=Course
3.b	Course Name: Angular JS
	Module Name: ngClass
	Apply multiple CSS classes to the text using ngClass directive.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_3459610297074182000_shared?collectionId=lex_2085851554325460000_0_shared&collectionType=Course
3.c	Course Name: Angular JS
	Module Name: Custom Attribute Directive
	Create an attribute directive called 'showMessage' which should display the given message in a paragraph when a user clicks on it and should change the text color to red.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_14783742359773809000_shared?collectionId=lex_208585155432546000_00_shared&collectionType=Course
4.a	Course Name: Angular JS
	Module Name: Property Binding
	Binding image with class property using property binding.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_8951964709153619000_shared?collectionId=lex_2085851554325460000_0_shared&collectionType=Course
4.b	Course Name: Angular JS
	Module Name: Attribute Binding
	Binding colspan attribute of a table element to the class property.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_7154252883180625000_shared?collectionId=lex_2085851554325460000_0_shared&collectionType=Course



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4.c	Course Name: Angular JS
	Module Name: Style and Event Binding
	Binding an element using inline style and user actions like entering text in input fields.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_7417401021103822000_shared?collectionId=lex_2085851554325460000_0_shared&collectionType=Course
5.a	Course Name: Angular JS
	Module Name: Built in Pipes
	Display the product code in lowercase and product name in uppercase using built-in pipes.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_11810543990912035000_shared?collectionId=lex_2085851554325460000_00_shared&collectionType=Course
5.b	Course Name: Angular JS
	Module Name: Passing Parameters to Pipes
	Apply built-in pipes with parameters to display product details.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_21187073707540988000_shared?collectionId=lex_2085851554325460000_00_shared&collectionType=Course
5.c	Course Name: Angular JS
	Module Name: Nested Components Basics
	Load CoursesListComponent in the root component when a user clicks on the View courses list button.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_24231999287700136000_shared?collectionId=lex_2085851554325460000_00_shared&collectionType=Course
6.a	Course Name: Angular JS
	Module Name: Passing data from Container Component to Child Component
	Create an AppComponent that displays a dropdown with a list of courses as values in it. Create another component called the CoursesList component and load it in AppComponent which should display the course details. When the user selects a course from the
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_15758356947336235000_shared?collectionId=lex_2085851554325460000_00_shared&collectionType=Course
6.b	Course Name: Angular JS
	Module Name: Passing data from Child Component to ContainerComponent
	Create an AppComponent that loads another component called the CoursesList component. Create another component called CoursesListComponent which should display the courses list in a table along with a register .button in each row. When a user clicks on th
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_2494980689916818400_shared?collectionId=lex_2085851554325460000_0_shared&collectionType=Course
6.c	Course Name: Angular JS
	Module Name: Shadow DOM
	Apply ShadowDOM and None encapsulation modes to components.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_10312243404892470000_shared?collectionId=lex_2085851554325460000_00_shared&collectionType=Course
6.d	Course Name: Angular JS
	Module Name: Component Life Cycle



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	Override component life-cycle hooks and logging the corresponding messages to understand the flow. https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_10818939635948007000_shared?collectionId=lex_208585155432546000_00_shared&collectionType=Course
7.a	Course Name: Angular JS Module Name: Template Driven Forms Create a course registration form as a template-driven form. https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_2810668513603024400_shared?collectionId=lex_2085851554325460000_0_shared&collectionType=Course
7.b	Course Name: Angular JS Module Name: Model Driven Forms or Reactive Forms Create an employee registration form as a reactive form. https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_33704702617536004000_shared?collectionId=lex_208585155432546000_00_shared&collectionType=Course
7.c	Course Name: Angular JS Module Name: Custom Validators in Reactive Forms Create a custom validator for an email field in the employee registration form (reactive form) https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_33728128192769250000_shared?collectionId=lex_208585155432546000_00_shared&collectionType=Course
8.a	Course Name: Angular JS Module Name: Custom Validators in Template Driven forms Create a custom validator for the email field in the course registration form. https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_27688491925133280000_shared?collectionId=lex_208585155432546000_00_shared&collectionType=Course
8.b	Course Name: Angular JS Module Name: Services Basics Create a Book Component which fetches book details like id, name and displays them on the page in a list format. Store the book details in an array and fetch the data using a custom service. https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_32584403823635940000_shared?collectionId=lex_208585155432546000_00_shared&collectionType=Course
8.c	Course Name: Angular JS Module Name: RxJS Observables Create and use an observable in Angular. https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_6209609363905256000_shared?collectionId=lex_2085851554325460000_0_shared&collectionType=Course
9.a	Course Name: Angular JS Module Name: Server Communication using HttpClient Create an application for Server Communication using HttpClient https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_0127637395317063682615_shared?collectionId=lex_208585155432546000000_shared&collectionType=Course
9.b	Course Name: Angular JS Module Name: Communicating with different backend services using Angular



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	HttpClient
	Create a custom service called ProductService in which Http class is used to fetch data stored in the JSON files.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_4266333361795059700_shared?collectionId=lex_2085851554325460000_0_shared&collectionType=Course
10.	Course Name: Angular JS
a	Module Name: Routing Basics, Router Links
	Create multiple components and add routing to provide navigation between them.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_3782024852517635000_shared?collectionId=lex_2085851554325460000_0_shared&collectionType=Course
10.	Course Name: Angular JS
b	Module Name: Route Guards
	Considering the same example used for routing, add route guard to BooksComponent. Only after logging in, the user should be able to access BooksComponent. If the user tries to give the URL of Bookscomponent in another tab or window, or if the user tries
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_30303325731876470000_shared?collectionId=lex_2085851554325460000_00_shared&collectionType=Course
10.	Course Name: Angular JS
c	Module Name: Asynchronous Routing
	Apply lazy loading to BookComponent. If lazy loading is not added to the demo, it has loaded in 1.14 s. Observe the load time at the bottom of the browser console. Press F12 in the browser and click the Network tab and check the Load time
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_9878739890118246000_shared?collectionId=lex_2085851554325460000_0_shared&collectionType=Course
10.	Course Name: Angular JS
d	Module Name: Nested Routes
	Implement Child Routes to a submodule.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_012768043900444672140_shared?collectionId=lex_20858515543254600000_shared&collectionType=Course
11.	Course Name: MongoDB Essentials - A Complete MongoDB Guide
a	Module Name: Installing MongoDB on the local computer, Create MongoDB Atlas Cluster
	Install MongoDB and configure ATLAS
	https://infyspringboard.onwingspan.com/web/en/viewer/video/lex_auth_01281821437313024030083_shared?collectionId=lex_auth_013177169294712832113_shared&collectionType=Course
11.	Course Name: MongoDB Essentials - A Complete MongoDB Guide
b	Module Name: Introduction to the CRUD Operations
	Write MongoDB queries to perform CRUD operations on document using insert(), find(), update(), remove()
	https://infyspringboard.onwingspan.com/web/en/viewer/video/lex_auth_01281821874166169630118_shared?collectionId=lex_auth_013177169294712832113_shared&collectionType=Course
12.	Course Name: MongoDB Essentials - A Complete MongoDB Guide
a	Module Name: Create and Delete Databases and Collections
	Write MongoDB queries to Create and drop databases and collections.
	https://infyspringboard.onwingspan.com/web/en/viewer/video/lex_auth_01281821654



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	119219230121_shared?collectionId=lex_auth_013177169294712832113_shared&collectionType=Course
12.	Course Name: MongoDB Essentials - A Complete MongoDB Guide
b	Module Name: Introduction to MongoDB Queries
	Write MongoDB queries to work with records using find(), limit(), sort(), createIndex(), aggregate().
	https://infyspringboard.onwingspan.com/web/en/viewer/video/lex_auth_0132890816264519682505_shared?collectionId=lex_auth_013177169294712832113_shared&collectionType=Course

Text Books:

1. Programming the World Wide Web, 7th Edition, Robert W Sebesta, Pearson.
2. Pro Mean Stack Development, 1st Edition, ELadElrom, Apress O'Reilly.
3. Full Stack JavaScript Development with MEAN, Colin J Ihrig, Adam Bretz, 1st edition, SitePoint, SitePoint Pty. Ltd., O'Reilly Media.
4. MongoDB – The Definitive Guide, 2nd Edition, Kristina Chodorow, O'Reilly

Software configuration and installation:

1. Angular
Setup details: Angular Application Setup - Internal - Viewer Page | Infosys Springboard (onwingspan.com)
2. MongoDB
TOC - MongoDB Essentials - A Complete MongoDB Guide | Infosys Springboard (onwingspan.com)

Web Links:

1. https://infyspringboard.onwingspan.com/en/app/toc/lex_20858515543254600000_shared/overview (Angular JS)
2. https://infyspringboard.onwingspan.com/en/app/toc/lex_auth_013177169294712832113_shared/overview (MongoDB)



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IV Year – I Semester	Minor Course	L	T	P	C
		3	0	2	4
SOFTWARE ENGINEERING					

Course Objectives:

This course is designed to acquire the generic software development skill through various stages of software life cycle and also to ensure the quality of software through software development with various protocol based environment

Course Outcomes:

Students taking this subject will gain software engineering skills in the following areas:

- Ability to transform an Object-Oriented Design into high quality, executable code
- Skills to design, implement, and execute test cases at the Unit and Integration level
- Compare conventional and agile software methods
- Prepare SRS document, design document, test cases and software configuration management and risk management related document.
- Develop function oriented and object oriented software design using tools like rational rose.
- Use modern engineering tools necessary for software project management, estimations, time management and software reuse
- Generate test cases for software testing

UNIT I

The Nature of Software, Software Engineering, The Software Process, Software Engineering Practice, Software Myths. A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology.

UNIT II

Agility, Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, A Tool Set for the Agile Process, Software Engineering Knowledge, Core Principles, Principles That Guide Each Framework Activity, Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

UNIT III

Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling, Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modelling.

UNIT IV

Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model, Software Architecture, Architectural Genres, Architectural Styles, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow, Components, Designing Class-Based Components, Conducting Component-Level Design, Component-Level Design for WebApps, Designing Traditional Components, Component- Based Development.

UNIT V

The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation, Elements of Software Quality Assurance, SQA Tasks, Goals & Metrics, Statistical SQA, Software Reliability, A Strategic Approach to Software Testing, Strategic Issues, Test Strategies



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps, Validation Testing, System Testing, The Art of Debugging, Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing.

List of Experiments:

- 1) Perform the following, for the following experiments:
 - i. Do the Requirement Analysis and Prepare SRS
 - ii. Draw E-R diagrams, DFD, CFD and structured charts for the project.
- 1) Course Registration System
- 2) Students Marks Analyzing System
- 3) Online Ticket Reservation System
- 4) Stock Maintenance
- 5) Draw the UML Diagrams for the problem 1,2, 3, 4.
- 6) Design the test cases for e-Commerce application (Flipcart, Amazon)
- 7) Design and Implement ATM system through UML Diagrams.

Text Books:

- 1) Software Engineering a practitioner's approach, Roger S. Pressman, Seventh Edition, McGraw Hill Higher Education.
- 2) Software Engineering, Ian Sommerville, Ninth Edition, Pearson.

Reference Books:

- 1) Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.
- 2) Software Engineering, Ugrasen Suman, Cengage.

e-Resources:

- 1) <https://nptel.ac.in/courses/106/105/106105182/>