Walchand Institute of Technology, Solapur
(An Autonomous Institute)

Affiliated to
Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Choice Based Credit System (CBCS)

Structure and Syllabus
for
Final Year B.Tech. Electronics & Computer Engineering
W.E.F. 2025-26

Dr. Mrs. M. A. Nirgude
Dean Academics

HEAD
Electronics Department
Walchand Institute of Technology
SOLAPUR-413006

WALCHAND INSTITUTE OF TECHNOLOGY WIT SOLAPUR (Autonomous)

Department of Electronics Engineering

Vision

- To be a distinguished centre for nurturing the holistic development of competent young engineers in the Electronics and Information Technology fields.

Mission

- **M1:**To inculcate and stimulate Electronics & Computer proficiency amongst students through quality education and innovative educational practices.
- **M2**: To create engineering professionals with social consciousness
- **M3:**To foster technical skills of students through creativity and critical thinking
- **M4**: To enhance soft skills set of students which is crucial for career success through effectual training

Electronics and Computer Engineering

Program Educational Objectives (PEOs)

- Graduates will have a successful professional career in Electronics & Information Technology fields.
- Graduates will Leverage his fundamental knowledge to pursue higher education and will continue his professional development in Electronics & Information Technology fields.
- Graduates will Exhibit professional ethics, team spirit and effective communication skills to be successful leader and manager with a holistic approach.
- Graduates will be sensitive to ethical, societal & environmental issues while conducting his professional work.

Program Outcomes (POs)

PO 1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO 3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities, relevant to the professional engineering practice.
PO 7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change

Program Specific Outcomes (PSOs)

1. **Algorithms:** Graduate will able to develop, realize and validate algorithms for different electronic systems and programming applications
2. **Systems:** Graduate will able to develop, implement and test different electronic systems and computer applications
3. **Self-Learning:** Graduate with his sound fundamentals is prepared to comprehend applications of the Electronics and Computer engineering through self-learning mode

Electronics and Computer Engineering

Legends Used	
L	Lecture Hours / week
T	Tutorial Hours / week
P	Practical Hours / week
FA	Formative Assessment
SA	Summative Assessment
ESE	End Semester Examination
ISE	In Semester Evaluation
ICA	Internal Continuous Assessment
POE	Practical and Oral Exam
OE	Oral Exam
MOOC	Massive Open Online Course
HSS	Humanity and Social Science
NPTEL	National Programme on Technology Enhanced Learning
F.Y.	First Year
S.Y.	Second Year
T.Y.	Third Year
B. Tech.	Bachelor of Technology

Electronics and Computer Engineering

Course Code Format

2	1	I	T	U/P	2	C	C	1	T/L
Year of Syllabus revision		Program Code		U-Under Graduate P-Post Graduate	Semester No./ Year1/2/3/…8	Course Type		Course Serial No1-9	T- Theory, L-Lab session A- Tutorial P- Programming

Program Code	
ECM	Electronics and Computer Engineering
Course Type	
BS	Basic Science
ES	Engineering Science
HU	Humanities & Social Science
MC	Mandatory Course
CC	Core Compulsory Course
SN*	Self-Learning **N*** *indicates the serial number of electives offered in the respective category*
EN*	Core Elective **N*** *indicates the serial number of electives offered in the respective category*
ON*	Open Elective **N*** *indicates the serial number of electives offered in the respective category*
SK	Skill Based Course
SM	Seminar
MP	Mini project
PR	Project
IN	Internship
Sample Course Code	
23ITU3CC1T	Discrete Mathematics Structures

Electronics and Computer Engineering

B. Tech. Semester VII

Course Code	Name of Course	Engagement Hours			Credits					Total
		L	T	P		Theory	OE/ POE	ISE	ICA	
22ECU7CC1T	Cloud Computing	3	--	--	3	60		40		100
22ECU7CC2T	Internet of Things	3	--	--	3	60		40		100
22ECU7CC3T	Mobile Communication and Computing	3	--	--	3	60		40		100
22ECU7CC3A	Mobile Communication and Computing (Tutorial)	--	1	--	1	--		--	25	25
22ECU7CC4T	Data Analytics	3	--	--	3	60		40		100
22ECU7EN*5T	Core Elective-II	3	--	--	3	60		40		100
22ECU7EN*5A	Core Elective-II (Tutorial)	--	1	--	1	--		--	25	25
	Sub Total	**15**	**2**		**17**	**300**		**200**	**50**	**550**
Laboratory Courses										
22ECU7CC1L	Cloud Computing Lab	--	--	2	1		25		25	50
22ECU7CC2L	Internet of Things Lab	--	--	2	1		25		25	50
22ECU7CC4L	Data Analytics Lab	--	--	2	1		25		25	50
22ECU7PR6L	Project Phase I	--	--	8	4		50		100	150
	Sub Total			**14**	**7**		**125**		**175**	**300**
	Grand Total	**15**	**2**	**14**	**24**	**300**	**125**	**200**	**225**	**850**

Electronics and Computer Engineering

B. Tech. Semester VIII

Course Code	Name of Course	Engagement Hours			Credits					Total
		L	T	P		Theory	OE/ POE	ISE	ICA	
22ECU8PR3L	Project Phase II	--	--	4	2		50		50	100
22ECU8IN4L	Internship / On Job Training (OJT)	--	--	20	10		100		100	200
	Total	**--**	**--**	**24**	**12**		**150**		**150**	**300**
	Grand Total	**--**	**--**	**24**	**12**		**150**		**150**	**300**
Final Year B.Tech (Sem VII and Sem VIII)		**15**	**2**	**38**	**36**	**300**	**275**	**200**	**375**	**1150**

Note:

- N*indicates the serial number of electives offered in the respective category
- ##indicates program code of offering Programme
- Core Elective II at Final year B. Tech. ECM Engineering, Semester VII

22ECU7EN*5T Core Elective II List

Sr. No	Course Code	Course Name
1	22ECU7E15T	Mechatronics and PLC
2	22ECU7E25T	Generative Artificial Intelligence
3	22ECU7E35T	Electric Vehicle Technology

- Internship / On Job Training (OJT) :
  a. Students may complete an internship / On Job Training (OJT) of a minimum of two months duration at the industry during Final Year Sem VIII.
  b. The Industry shall appoint a Supervisor to assess the performance of the student and share the same with the departmental supervisor for the fulfilment of ICA marks
  c. The student shall prepare a report of the work completed at the Industry duly endorsed by the industry Supervisor and submit the same as an Internship report.
  d. The ESE for Internship / On Job Training (OJT) shall be conducted by the departmental supervisor in the presence of an external industry or academic expert

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
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Final Year B.Tech. (Electronics and Computer Engineering), Semester-VII

22ECU7CC1T: Cloud Computing

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hours/week	**ESE**	60 Marks
Practical	2 Hours/week	**ISE**	40 Marks
Credits	4	**ICA**	25 Marks
		OE	25 Marks

Introduction:

Cloud Computing is a dominating paradigm in computing that offers on-demand access to a shared pool of configurable computing resources, such as networks, servers, storage, applications, and services, over the internet. It enables organizations to rapidly scale their IT infrastructure, reduce costs, and increase agility by leveraging the power of virtualization, automation, and resource pooling. By learning this subject, students gain skills and knowledge that are highly sought after by employers across various industries, making them more competitive in the job market. By learning cloud computing concepts and skills, students future-proof their careers and position themselves for success in a rapidly evolving technological landscape.

Course Prerequisite:

Students should have a strong understanding of computer science fundamentals, including data structures, algorithms, operating systems, networking, web technologies and database systems.

Course Objectives:

1. Analyze the fundamental concepts and architectural components of cloud computing, including virtualization, service models (IaaS, PaaS, SaaS), deployment models (public, private, hybrid), and scalability.
2. Evaluate different cloud computing platforms and providers based on their features, performance, reliability, security, and cost-effectiveness to make informed decisions in deploying cloud-based solutions.
3. Critically assess the challenges and risks associated with cloud computing, including data privacy, security vulnerabilities, compliance, vendor lock-in, and legal issues, and propose strategies to mitigate these risks.
4. Collaborate effectively in multidisciplinary teams to solve complex problems and address ethical, social, and environmental issues related to the adoption and usage of cloud computing technologies in diverse domains.

Course Outcomes:

After completing this course, student will be able to –

1. Analyze various cloud service and deployment models to assess their impact on scalability, elasticity, and resilience in cloud environments.
2. Illustrate the role of virtualization technologies and hypervisors in managing cloud infrastructure performance and security.
3. Elaborate cloud security strategies and compliance measures with respect to threats, data privacy, and regulatory requirements like GDPR and HIPAA.
4. Compare the features, pricing models and performance benchmarks of major cloud service providers to identify suitable platforms for diverse application needs.

Unit – I	**Principles and Components of Cloud Computing**	**08 Hours**

Introduction to Cloud Computing, Cloud Service Models (IaaS, PaaS, SaaS), Cloud Deployment Models (Public, Private, Hybrid), Cloud Infrastructure Components (Servers, Storage, Networking), Scalability, Elasticity, and Resilience in Cloud Computing

Unit – II	**Virtualization in Cloud Computing**	**06 Hours**

Introduction to Virtualization and Hypervisors, Types of Hypervisors (Type 1, Type 2),Virtual Machine (VM) Management, Hypervisor Security and Performance Considerations, Impact of Hypervisors on Cloud Computing Infrastructure

Unit – III	**Security Risks and Compliance in Cloud Computing**	**08 Hours**

Cloud Security Fundamentals, Threats and Vulnerabilities in Cloud Environments, Identity and Access Management (IAM), Data Encryption and Privacy, Regulatory Compliance (GDPR, HIPAA, PCI DSS), Cloud Security Best Practices and Tools

Unit – IV	**Cloud Service Providers**	**10 Hours**

Overview of Cloud Service Providers (AWS, Azure, Google Cloud, etc.), Comparison of Service Offerings, Pricing Models (on-demand, reserved, spot instances), and SLAs (for uptime, performance, and support), Performance Benchmarks and Reliability Metrics (latency, throughput, and availability), Case Studies and Use Cases for Different Cloud Providers.

Unit – V	**Cloud Services for Developers**	**10 Hours**

Introduction to Developer Services in cloud, Compute Services (AWS Lambda, Google App Engine, Azure Functions), Storage Services(Amazon S3, Google Cloud Storage, Azure Blob Storage), Database Services(Amazon RDS, Google Cloud SQL, Azure SQL Database), Networking Services (Amazon VPC, Google Cloud Virtual Network, Azure Virtual Network), Developer Tools and SDKs (AWS CLI, Google Cloud SDK, Azure CLI), Case Studies.

Internal Continuous Assessment (ICA)

ICA shall consist of minimum 8 experiments based on AWS Academy Certification course syllabus and Infosys Springboard course assignments-

1. AWS and Google cloud setup and configuring various services – Students shall learn to setup the cloud services for various use cases.
2. Develop a small project using AWS Serverless services like API Gateway, Lambda, Dynamodb etc.
3. It is recommended that with a group of 4/5 students, few lab sessions shall be utilized for carrying out a small project.
4. Students must submit AWS Cloud Academy Cloud Certification and Infosys Springboard Course Certificate by the end of semester.

Text Books

1. "Cloud Computing: Principles and Paradigms" by Rajkumar Buyya, James Broberg, and Andrzej M. Goscinski, Edition: 1st Edition, Publication: Wiley, 2012
2. "Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl, Ricardo Puttini, and Zaigham Mahmood, Edition: 1st Edition, Publication: Prentice Hall, 2014
3. “Cloud Computing for Dummies”, by Judith Hurwitz, Daniel Kirsch, Edition: 2nd Edition, Publication: Wiley, 2020

Reference Books

1. "Cloud Native Patterns: Designing Change-tolerant Software" by Cornelia Davis, Edition: 1st Edition,Publication: O'Reilly Media, 2019
2. AWS Documentation: URL- https://docs.aws.amazon.com/
3. Google Cloud Documentation: URL - https://cloud.google.com/docs/
4. Azure Cloud Documentation: URL- https://learn.microsoft.com/en-us/azure/cloud-services/

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
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Final Year B.Tech. (Electronics and Computer Engineering), Semester-VII

22ECU7CC2T : Internet of Things

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hours/week	**ESE**	60 Marks
Practical	2 Hours/week	**ISE**	40 Marks
Credits	4	**ICA**	25 Marks
		OE	25 Marks

Introduction:

The Internet of Things (IoT) refers to the systems in which different devices, equipped with sensors and signal processing, are connected through a network to communicate with each other with/without central servers. This course provides a thorough introduction to the different components of an IoT system. The course also introduces cloud platforms for IoT and different communication protocols. Introduction to different controller boards is also a part of this course.

Course Prerequisite:

Students should have a solid grasp of computer networks, programming languages like C, Python, and basic electronics knowledge before delving into IoT. Proficiency in handling sensors, microcontrollers and building embedded system will be advantageous

Course Objectives:

1. To make students aware of the different components of an IoT System
2. To make students learn the architecture of ESP32.
3. To make students learn the interfacing of different peripherals with microcontroller.
4. To make students learn different communication technologies and application protocols used in IoT.
5. To introduce to students different IoT-enabling technologies and security.

Course Outcomes:

After completing this course, students will be able to-

1. Identify the different layers of IoT system architecture and evaluate the importance of design standardization in ensuring interoperability and scalability.
2. Design a solution based on controller board for a given problem.
3. Compare different communication technologies and application protocols used in IoT.
4. Design interfacing of sensors and actuators and write pseudo code for different applications using third-party tools for controller board.
5. Analyse the different IoT enabling technologies and security for a given application

Unit – I	**Introduction to IoT**	**07 Hours**
Introduction to IoT, IoT-a reference architecture, conceptual framework, M2M communication, IoT system layers and design standardization, data enrichment & consolidation, device management at gateway, prototyping the embedded systems for IoT, IoT use cases.		
Unit – II	**Design and Development**	**07 Hours**
Design Methodology – Embedded computing logic – Microcontroller, System on Chips – IoT system building blocks – ESP32 – Board details, IDE programming		
Unit – III	**Communication Technologies for IoT**	**07 Hours**
Basics of the communication technologies like Bluetooth Low Energy (BLE), Zigbee, Wifi, RFID, their architecture, characteristics, limitation, power consumption parameters and applications.		
Unit – IV	**Application Protocols for IoT**	**07 Hours**
Basics of application protocols like MQTT and CoAP, their features, framework, message formats, implementations and applications.		
Unit – V	**Cloud Platforms for IoT**	**08 Hours**
Cloud architecture for IoT, cloud characteristics, delivery & deployment models, survey of various IoT cloud platforms, cost metrics & pricing models for cloud services, service quality metrics for cloud platforms, and introduction to Node-RED tool from the IBM Watson IoT Platform.		
Unit – VI	**Privacy, Security and Vulnerabilities Solutions**	**06 Hours**
Introduction to security and privacy, vulnerabilities, security requirements and threat analysis, layered attacker model, security models, profiles and protocols for IoT.		
Internal Continuous Assessment (ICA)		
ICA shall consist of minimum eight experiments. Also students shall complete a mini-project in group applying their acquired skills and knowledge during this course 1. Interfacing general purpose I/O devices like LED's, switches 2. Interfacing motors with development board 3. Reading sensor values and plotting them on the PC through UART 4. Interfacing BLE/WIFI modules with development board 5. Sending sensor data to the cloud using Wi-Fi 6. Sending sensor data to cell phone using BLE. 7. Implement an interrupt handler to illustrate low power feature 8. Implement Bluetooth Low Energy connection between the microcontroller kit and smart Devices. 9. Implement data logger system using cloud 10. Implement Cloud based user interface panel for System Control.		

Text Books

1. Internet of Things: Architecture and Design Principles by Kamal, Raj. India, Mc Graw Hill India, 2017.
2. Internet of Things for Architects: Architecting IoT Solutions by Implementing Sensors, Communication Infrastructure, Edge Computing, Analytics, and Security. United Kingdom, by Lea, Perry, Packt Publishing, 2018.
3. Internet of Things Projects with ESP32: Build Exciting and Powerful IoT Projects Using the All-new Espressif ESP32 by Kurniawan, Agus, India, Packt Publishing, 2019.
4. Designing Embedded Systems and the Internet of Things (IoT) with the ARM Mbed by Xiao, Perry. United Kingdom, Wiley, 2018.

Reference Books

1. Enterprise Internet of Things Handbook by Arvind Ravulavaru
2. Internet-of-Things (IoT) Systems: Architectures, Algorithms, Methodologies by Dimitrios Serpanos, Marilyn Wolf.
3. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl, Ricardo Puttini, Zaigham Mahmood.
4. Learning Internet of Things by Peter Waher ESP32 Technical Reference

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
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22ECU7CC3T: Mobile Communication and Computing

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hours/week	**ESE**	60 Marks
Tutorial	1 Hour/week	**ISE**	40 Marks
Credits	4	**ICA**	25 Marks

Introduction:

The last decade of 20th century has witnessed a lot of activities in wireless and mobile communication and a convergence of communication technology and information technology. This fundamental course in mobile communication aims at triggering interest of students into two major fields of mobile communication. First section of this course covers cellular mobile communication with major focus on 4G GSM standard. The second section discusses topics related to mobile computing for digital data transfer.

Course Prerequisite:

Student shall have basic knowledge of digital communication systems and fundamental knowledge of internet and computer networks in general.

Course Objectives:

1. To introduce student to the basic concepts of wireless communication and mobility.
2. To introduce student to cellular communication and frequency reuse concepts.
3. To introduce students to the architecture, operation, and protocols of digital cellular systems, with a focus on GSM, CDMA, and related technologies such as GPRS, DECT, and UMTS.
4. To familiarize students with wireless LAN technologies and Bluetooth, including IEEE 802.11 standards, MAC protocols, and Bluetooth layers and architecture
5. To make student aware about the networking and transport protocols used in mobile communication, such as Mobile IP, mobile TCP variants, and wireless application protocols for efficient mobile data transmission.

Course Outcomes:

After completing this course, student will be able to -

1. Describe the fundamentals of wireless communication and accessing techniques for cellular and mobile communications.
2. Analyze basic cellular system by view of frequency reuse, co-channel Interference and different methods of cell splitting and sectoring.
3. Describe the architecture and functioning of digital cellular systems such as GSM and CDMA
4. Explain the principles and technologies behind wireless LANs and Bluetooth
5. Explain TCP/IP extensions for mobile and wireless networking.

Unit – I	**Fundamentals of Mobile Communication**	**06 Hours**
Wireless and mobility, applications, mobile radio environment- signal propagation, path loss, fading, other signal propagation effects, medium access -SDMA, TDMA, FDMA, CDMA, DAMA, PRMA, MAC/CA, control-hidden and exposed terminal, near and far terminals, MAC for mobile.		
Unit – II	**The Cellular Concepts**	**06 Hours**
Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity, sectorization, traffic engineering, Infinite sources, lost calls cleared, grade of service		
Unit – III	**Digital Cellular System- GSM & CDMA**	**12 Hours**
GSM- Services, system architecture, radio interface, logical channels, protocols, localization and calling, handover, security, HSCSD, GPRS-architecture, Interfaces, Channels, mobility management DECT, TETRA, UMTS. CDMA- Direct sequence spread spectrum, processing gain, pseudorandom sequences, orthogonal codes, IS 95- frequency and channel specifications		
Unit – IV	**Mobile Computing**	**2 Hours**
Introduction, functions, devices, environment – middleware and gateways, architecture, applications and services.		
Unit – V	**Wireless LAN- IEEE 802.11 and Bluetooth**	**8 Hours**
IEEE 802.11: LAN-architecture, 802.11 a, b and g, protocol architecture, physical layer, MAC layer , MAC management, HIPERLAN-protocol architecture, physical layer, access control sub layer, MAC sub layer. Bluetooth - User scenario, architecture, protocol stack, radio layer, baseband layer, physical links		
Unit – VI	**Mobile TCP/IP**	**8 Hours**
Mobile IP, DHCP, Ad hoc networks: Characteristics, performance issue, routing in mobile host. Wireless sensor network, Mobile transport layer: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, and transaction-oriented TCP. Introduction to Wireless Application Protocol.		

Internal Continuous Assessment (ICA)

ICA consists of minimum 8 tutorials based on curriculum. Recommended Tutorials:

1. Identify the different sections and components in mobile phone
2. Identify in built sensor in mobile handset and test their performance.
3. Determine the coverage area for split area in cellular system.
4. Determine the channel capacity of the cellular system service area with 4/7/12 microcells and compare with 8/12/16 microcells
5. Determine the voice channel assignments for different sector in cellular system.
6. Use network simulation software (e.g., NS3, OMNeT++) to create GSM and CDMA network models.
7. Simulate call setup, handoff, and data transmission in the networks.
8. Analyze performance metrics such as latency, throughput, and error rates.

Text Books

1. Wireless Communications: Principles and Practice; Theodore S. Rappaport; 2n edition; PHI Learning Private Limited
2. Mobile Computing; Asoke K Talukdar, Roopa R Yavagal; Tata McGraw Hill Publishing Company Limited,
3. Introduction to Wireless & Mobile Systems; Dharma Prakash Agrawal, Qing-An Zeng; 3rd edition; Cengage Learning

Reference Books

1. J. Schiller, “Mobile Communication”, Addison , Wiley
2. William Stalling, “Wireless Communication and Network”, Pearson Education
3. Upena Dalal,” Wireless Communication”, Oxford Higher Education
4. Dr. Kamilo Feher, “Wireless Digital communication”, PHI
5. William C.Y Lee, “Mobile Communication Design Fundamental” , John Wiley

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22ECU7CC4T: Data Analytics

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hours/week	**ESE**	60 Marks
Practical	2 Hours/week	**ISE**	40 Marks
Credits	4	**ICA**	25 Marks
		POE	25 Marks

Introduction:

The information in the world doubles every 20 months. Important data sources are business and industrial processes, text and structured data bases, image and biomedical data. Many applications show that data analytics can provide huge benefits. We need models and algorithms to collect, preprocess, analyze, and evaluate data, from various fields such as statistics, system theory, machine learning, pattern recognition, or computational intelligence. This basic course is designed to provide the most important methods and algorithms for data analytics. This course focuses on the understanding of the basic concepts of data analytics, which will allow student to keep pace and to actively contribute to the advancement of the growing field of data analytics.

Course Prerequisite:

Student must have completed a fundamental course in Machine Learning. He shall have adept knowledge of algorithms and data structures, database management systems and a high-level programming language preferably Python or R. Student shall also have basic knowledge of algebra and geometry.

Course Objectives:

1. To make student realize the concept of data and its types
2. To introduce to student various data and types
3. To introduce to students' different statistical descriptors associated with data
4. To make student understand data similarity and dissimilarity measures for different data types
5. To make student understand how the data can be pre-processed in order to improve the quality of the data
6. To present student 'big picture' of data analytics applications and expose him to contemporary data analytics and business analytics applications

Course Outcomes:

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

1. Evaluate importance of data in modern era
2. Illustrate various data types with their attributes
3. Evaluate basic statistical descriptors associated with data
4. Calculate similarity and dissimilarity measures for different data types
5. Analyse the methods used for preprocessing of the data and feature extraction process
6. Present case studies for data analytics and business analytics applications and can design simple steps for new data analytics application

Unit – I	**Knowing Data**	**6 Hours**

What is data, what we can do with data, data processing and analytics flow, data matrix, patterns, attributes, data - geometric, algebraic and probabilistic view

Unit – II	**Data Objects and Attribute Types**	**8 Hours**

Non-dependency-oriented data, dependency-oriented data, quantitative multidimensional data, categorical and mixed attribute data, binary and set data, text data, time-series data, discrete sequences and strings, spatial data, spatiotemporal data, network and graph data

Unit – III	**Basic Statistical Descriptions of Data**	**6 Hours**

Measuring the central tendency, measuring the dispersion of data, boxplots, and outliers, variance and standard deviation, univariate analysis, multivariate analysis, graphic displays of basic statistical descriptions of data - quantile plot, quantile–quantile plot, histograms, scatter plots and data correlation

Unit – IV	**Measuring Data Similarity and Dissimilarity**	**8 Hours**

Data matrix versus dissimilarity matrix, proximity measures for nominal attributes, proximity measures for binary attributes, Minkowski distance, proximity measures for ordinal attributes, dissimilarity for attributes of mixed types

Unit – V	**Data Pre-processing**	**8 Hours**

Data pre-processing: an overview, data cleaning, data integration, data transformation and data discretization, feature extraction, data type portability, data cleaning, sampling, dimensionality reduction

Unit – VI	**Applications of Data Analytics**	**6 Hours**

Revision of supervised and unsupervised learning models

Applications - data mining, exploratory data analysis, frequent pattern mining, clustering, classification, outlier detection, business analytics

Internal Continuous Assessment (ICA)

ICA shall consist of minimum eight experiments. Also students shall complete a mini-project in

group applying their acquired skills and knowledge during this course

1. Program based on different data types and its use
2. Program based on statistical description of data using boxplots, histograms, and scatter plots.
3. Program based on central tendency and dispersion
4. Program based on visualization techniques for analyzing univariate data with mixed attribute types.
5. Use of Python libraries to visualize and analyze a statistical description of data using Q-Q plots.
6. Program based on patterns and relationships identification using EDA techniques and Python libraries.
7. Program based on outlier detection and data cleaning using Python.
8. Implementation of a basic data processing pipeline from raw data to cleaned output using Python.

Text Books

1. A General Introduction to Data Analytics, João Mendes Moreira, João Mendes Moreira, Tomáš Horváth, JohnWiley & Sons, Inc
2. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, Elsevier
3. Data Mining and Analysis- Fundamental Concepts and Algorithms, Mohammed J. Zaki, Wagner Meira Jr., Cambridge University Press
4. Data Mining: The Textbook by Charu C. Aggarwal, Springer Publisher
5. Data Analytics, Anil Maheshwari, McGraw Hill Education (India) Pvt. Ltd.

Reference Books

1. Rene Carmona "Statistical Analysis of Financial Data in R", Springer, 2014.
   Glenn J. Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, John Wiley Publishers, 2014.
2. Python Data Science Handbook – Essential Tools for working with Data : Jake VanderPlas, O‟rielly (Unit III, IV, VI)

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
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Final Year B.Tech. (Electronics and Computer Engineering), Semester-VII

22ECU7E15T : Core Elective II - Mechatronics and PLC

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hours/week	**ESE**	60 Marks
Tutorial	1 Hour/week	**ISE**	40 Marks
Credits	4	**ICA**	25 Marks

Introduction:

Mechatronics is a multidisciplinary application of engineering that includes a combination of mechanical engineering, electrical engineering and electronics engineering. A programmable logic controller, PLC or programmable controller is a digital computer used for automation of typically industrial electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. This course aims at providing an overview of the basics of mechatronics systems including the components and characteristics typical for such systems and to introduce to student functions, interfacing and programming of the PLC.

Course Prerequisite:

Student shall have an adept knowledge of basic electrical circuit theory, power devices, digital logic, microcontroller hardware design and interfacing of electrical parts with microcontroller. They shall also possess knowledge about basic mechanical systems.

Course Objectives:

1. To introduce to students the basic concept and key elements of mechatronics system.
2. To make student understand the working principal of different sensors, transducers and pneumatic and hydraulic actuation system.
3. To introduce to student the architecture of the PLC in industrial applications.
4. To make student design and analyze programs for different applications with sensor & actuator.

Course Outcomes:

After completing this course, student shall be able to -

1. Apply design process and control systems to implement small mechatronics system.
2. Apply working principal of sensors to measure various physical parameters and design simple systems involving hydraulic/ pneumatic directional control valves and cylinders.
3. Outline the architecture of PLC and classify their applications.
4. Develop and analyze PLC programs for different applications.

Unit – I	**Introduction to Mechatronics**	**7 Hours**
What is mechatronics, mechatronics key elements, the design process, measurement systems, control systems, microprocessor-based controllers, examples of mechatronics systems		
Unit – II	**Sensors and Transducers**	**7 Hours**
Sensors and transducers, performance terminology; displacement measurement, position and proximity; velocity and motion; force, fluid pressure, liquid flow, liquid level, temperature, light sensor, selection of sensors		
Unit – III	**Pneumatic and Hydraulic Actuation System**	**8 Hours**
Actuation systems, pneumatic and hydraulic systems, directional control valves, pressure control valves, cylinders, process control valves, rotary actuators		
Unit – IV	**Introduction to Programmable Controllers**	**7 Hours**
Controllers, microprocessor-based controllers, PLC controllers, typical PLC system, internal architecture of PLC, PLC ladder diagrams, ladder symbols		
Unit – V	**Ladder and Functional Block Programming**	**8 Hours**
PLC ladder programming, logic functions- AND, OR, NOT, NAND, NOR, XOR, latching, multiple outputs, programming examples, programming methods, internal relays, jump and call, timers, counters		
Unit – VI	**PLC Advanced Programming and Interfacing**	**7 Hours**
Loop commands, shift registers, data manipulations, PLC systems for designing temperature controller, valve sequencing, and conveyor belt control		

Internal Continuous Assessment (ICA)

ICA consists of minimum 8 Tutorials based on :

1. Mechatronics systems using microprocessor.
2. Interfacing of varies sensors.
3. Pneumatic and Hydraulic Actuation System
4. Ladder diagrams and programming for industry applications.
5. PLC Programming and Interfacing.

Text Books

1. Mechatronics: Electronic control systems in mechanical and electrical engineering; W. Bolton Pearson Publications, 6th edition
2. Mechatronics Principles, Concepts and Applications; N.P. Mahalik; Tata McGraw-Hill
3. Programmable Logic Controllers; Bolton, Elsevier-Newnes; 3rd Edition
4. Programmable Logic Controllers Programming Methods and Applications; John R. Hack Worth, Frederick D. Hackworth, Jr.; Prentice Hall India

Reference Books

1. Computer Control of Manufacturing Systems; Yoram Koren; McGraw Hill
2. Mechatronics Principles and Applications; Godfrey Onwubolu, Elsevier Butterworth-Heinemann
3. Programmable Logic Controllers and applications; John W Webb Ronald A. Reis, PHI Learning
4. Programmable Logic Controllers, Frank Petruzella, McGraw-Hill Higher Education

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
(An Autonomous Institute)
Final Year B.Tech. (Electronics and Computer Engineering) Semester-VII

22ECU7E25T : Core Elective II- Generative Artificial Intelligence

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hours/week	**ESE**	60 Marks
Tutorial	1 Hour/week	**ISE**	40 Marks
Credits	4	**ICA**	25 Marks

Introduction:

In recent years, the advent of large language models, such as OpenAI's GPT (Generative Pre-trained Transformer), has revolutionized the field of generative AI, enabling machines to generate human-like text and code. Thus, this course also explores the role of large language models in programming, including code generation, code completion, and program synthesis. Through projects and theoretical studies, students will understand the underlying principles of generative AI, its applications across various domains, and its implications for the future of human-machine interaction, artistic expression, and software development.

Course Prerequisite:

Students should have fundamental understanding of Artificial Intelligence and Machine Learning concepts, proficiency in at least one programming language, preferably Python, basic knowledge of algorithms and data structures and Familiarity with linear algebra and probability theory.

Course Objectives:

1. Understand the fundamentals of Generative AI and Deep Neural Networks (DNNs).
2. Develop skills in preprocessing text data and representing it using NLP techniques.
3. Explore the capabilities of Recurrent Neural Networks (RNNs) for text generation tasks
4. Evaluate the principles of code generation using generative models like Seq2Seq and CodeBERT, Investigate attention mechanisms and Transformer architectures.

Course Outcomes:

After completing this course, student will be able to –

1. Describe the foundational concepts of Generative AI and demonstrate an understanding of deep neural networks used in generative tasks.
2. Apply preprocessing and representation techniques for textual data and apply word embeddings for semantic understanding.
3. Analyze the architectural differences and performance characteristics of RNN, LSTM, GRU and discuss LSTM and GRU models in the context of sequential text generation tasks.
4. Evaluate code generation models and transformer-based models such as CodeBERT and GPT for source code generation, and *discuss* the roles of attention mechanisms and pre-trained architectures.

Unit – I	**Foundations of Generative AI and Deep Neural Networks**	**10 Hours**
Overview of Generative AI and its applications, Historical context and evolution of generative models, Key concepts: probability distributions, latent space, autoregressive models. Introduction to Deep Neural Networks (DNNs): Basic architecture and functioning of DNNs, Common activation functions and their role, Training DNNs with backpropagation and gradient descent.		
Unit – II	**Natural Language Processing and Text Representation**	**10 Hours**
Overview of Natural Language Processing (NLP) and its applications. Preprocessing techniques for text data: Tokenization, stemming, lemmatization, Stop words removal, punctuation removal. Text representation methods: Bag-of-Words (BoW) model, TF-IDF (Term Frequency-Inverse Document Frequency) representation. Word embeddings: Word2Vec, GloVe (Global Vectors for Word Representation).		
Unit – III	**Text Generation using RNNs and LSTM/GRU**	**12 Hours**
Introduction to Recurrent Neural Networks (RNNs). Training and sampling with RNN-based language models. Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) architectures		
Unit – IV	**Code Generation using Transformer-Based Models**	**13 Hours**
Overview of code generation tasks and their significance in software development, sequence-to-sequence (Seq2Seq) models and their architecture, Encoder-decoder architecture, Introduction to attention mechanisms, Transformer architecture and its advantages in code generation, Positional encoding and self-attention mechanism in Transformers, Introduction Code-specific models: CodeBERT and GPT models		

Internal Continuous Assessment (ICA)

ICA shall consist of minimum eight experiments based on below content. Also students shall complete a mini-project in group applying their acquired skills and knowledge during this course

- **Unit 1:** Trace the evolution of AI through model-based vs data-driven paradigms.
- **Unit 2:** Hand-solve tokenization and TF-IDF problems on sample text.
- **Unit 3:** Manually trace input-output sequences through LSTM cells.
- **Unit 4:** Discuss outputs of GPT and CodeBERT on prompt-based code generation tasks

Text Books

1. "Generative Deep Learning Teaching Machines to Paint, Write, Compose, and Play" by David Foster, Published by O'Reilly Media, Inc.
2. "Artificial Intelligence-A Modern Approach" by Stuart Russell and Peter Norvig, 4th Edition 2012, Published by Pearson Publications.
3. "Natural Language Processing Recipes", by Akshay Kulkarni and Adarsha Shivananda, Published by Apress.

Reference Books

1. "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, Published by MIT Press
2. "Handbook Of Natural Language Processing" Edited By Nitin IndurkhyaAnd Fred J. Damerau Second Edition, Chapman & Hall/CRC Taylor & Francis Group
3. Online Reference : URL - https://www.deeplearningbook.org/
4. Online Reference : Generative AI for Beginners (Version 2) - A Course URL - https://github.com/microsoft/generative-ai-for-beginners

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
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Final Year B.Tech. (Electronics and Computer Engineering), Semester-VII

22ECU7E35T: Core Elective II - Electric Vehicle Technology

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hours/week	**ESE**	60 Marks
Tutorial	1 Hour/week	**ISE**	40 Marks
Credits	4	**ICA**	25 Marks

Introduction:

This course provides an in-depth understanding of electric vehicle (EV) systems, focusing on the electronics and computer engineering aspects. Topics covered include EV components, EV motors , EV controllers, battery management systems and Charging Infrastructure. Different energy storage technologies are introduced, including batteries, ultra-capacitors and flywheels.

Course Prerequisite:

Student shall have knowledge of Power Electronics, electric motor working principles, Embedded systems.

Course Objectives:

1. To make students aware about electric vehicles technology and its relevance in today's era.
2. To introduce to students of motor and controller for the electric vehicles.
3. To make students learn the details of battery and related charger technology for use in electric vehicles
4. To enable students to recognize the major technical, economic, and infrastructural challenges limiting the adoption of electric vehicles.

Course Outcomes:

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

1. Compare and contrast between conventional vehicles and the electric vehicles.
2. Select motor and appropriate controller for given specifications.
3. Choose suitable battery and charger technology for given specifications.
4. Identify and analyze the primary challenges facing the adoption of electric vehicles.

Unit – I	**Introduction to Electric Vehicles**	**5 Hours**

The need of EV's, types of EV's, block diagram and working principle of EV, major components of EV, comparison between and petrol/diesel vehicle and the electric vehicles, advantages of EV's over conventional vehicles, government role in promoting EV, predicted market growth of EV's in next few years.

Unit – II	**EV Motors**	**10 Hours**
Motors for EV: brushless dc motor (BLDC), permanent magnet synchronous motor(PMSM), induction motor, synchronous reluctance motor , their technical specifications, construction, working, characteristics, selection criteria of motors for EV's used for these motors.		
Unit – III	**EV Controllers**	**6 Hours**
General design of a control system, step down dc controller, step up dc controller, single phase inverter and three phase inverter		
Unit – IV	**Battery Technologies**	**10 Hours**
Introduction to energy storage requirements in electric vehicles, battery parameters, batteries for EVs: lead acid, lithium ion, sodium ion, nickel-based , aluminum air battery, technical specifications, Characteristics, selection criteria of batteries for EV's. battery management system (BMS), comparison of batteries and scope of development, upcoming technologies in battery, ultra-capacitors, and flywheels		
Unit – V	**Charging Infrastructure**	**6 Hours**
Basics of charging and infrastructure, types of charging and its function, points to be considered in design of charger, types of chargers and working principles, sources and utilization of renewable energy for charging		
Unit – VI	**Challenges in EV and Solutions**	**5 Hours**
Charging and infrastructure issues, troubles shootings in drive trains, troubleshooting in batteries, maintenances of EVs, safety and precaution for EVs		

Internal Continuous Assessment (ICA)

ICA consists of minimum 6 tutorials based on above content

1. Motor selection criterion for EVs
2. DC-DC Converter Design for EVs
3. Single phase inverter for EVs
4. Three phase inverter for EVs
5. Battery technologies in EVs
6. Design of battery management system
7. Design of charging system
8. Challenges and maintenance for EVs

Text Books

1. Basic Electric Vehicle Technology Explained John Lawry- Wiley publications.
2. Electric & Hybrid vehicles -Tom Denton- Institute of the Motor Industry.
3. Modern Electric, Hybrid Ele. & fuel Cell vehicles - Mehrdad Ehsani, Yimin Gao -CRC Press.

Reference Books

1. Electric Powertrain - Energy Systems, Power electronics and drives for Hybrid, electric and fuel cell vehicles by John G. Hayes and A. Goodarzi, Wiley Publication.
2. D. A. J. Rand, R. Woods, and R. M. Dell, "Batteries for Electric Vehicles," Society of Automotive Engineers," Warrendale PA, 2003.
3. Energy Storage by Robert A. Huggins, Springer Publication

- **Swayam/NPTEL Reference :**

1. Electric Vehicles and Renewable Energy by Prof. Ashok Jhunjhunwala, Prof. Kaushal Jha, Prof. L Kannan, Prof. Prabhjot Kaur ,IIT Madras
2. Additional web recourses :https://bacancysystems.com/blog/types-of-ev-chargers

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

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Final Year B.Tech. (Electronics and Computer Engineering), Semester-VII

22ECU7PR6L: Project Phase I

Teaching Scheme		**Examination Scheme**	
Lectures	-	**ESE**	-
Practical	8 Hours/week	**ICA**	100 Marks
Credits	4	**OE**	50 Marks

Introduction:

Project based learning is a paradigm which is becoming time-honored now a days. To keep abreast with this, Project course is included in the curriculum which is spread over both semesters of final year. For this course students carry out a project as a team that allows them to demonstrate their abilities and to develop skills within their chosen area of interest. Hardware realization as well software simulation projects with focus on design and research aspects are accepted. Also communicating effectively, both in oral and written form is an important skill for engineering graduates in many different contexts. This course also aims to foster these skills

Course Prerequisite:

Student shall have technical competency as well as behavioral facet to carry project as a part of a team. He shall have an adept knowledge of hardware and software architecture and associated programming skills. He shall also possess necessary technical report writing skills, presentation skills and shall have proficiency in office software for word processing and presentation

Course Objectives:

1. To expose students to the fields in electronics , computers , information technology, and allied areas to identify the problems and formulate the problem statement
2. To make students aware of the recent trends used to solve the problem selected.
3. To make students able to conduct preliminary experiments, surveys, and simulations for solving the selected problem.
4. To make students able to design the electronic systems , software systems, models, and algorithms to solve the selected problem
5. To make students able to document the technical specifications, architecture, processes, related to the solution.

Course Outcomes:

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

1. Formulate precise problem statement for potential solution to a selected problem.
2. Investigate and evaluate recent practices, processes, and technologies being utilized to address the selected problem
3. Apply appropriate experimentation, surveying, data acquisition, and simulation methods to analyze the feasibility of proposed solutions for the selected problem.
4. Design the system-level architecture, processes, and algorithms to meet the technical solution of the selected problem.
5. Record and report technical specifications, architecture, processes, related to the design of the selected problem

Internal Continuous Assessment (ICA)

The objective of Project Phase – I is to enable the student to take up investigative study in the broad field of Electronics Engineering and allied fields, either fully practical or involving both theoretical and practical work to be assigned by the department on basis three students in a group, under the guidance of a supervisor.

This is expected to provide a good initiation for the students in further career building. The tasks during Project Phase – I include –

1. Survey and study of published literature on the assigned topic.
2. Working out a preliminary Approach to the Problem relating to the assigned topic.
3. Conducting preliminary Analysis / Modelling / Simulation / Experiment /Design / Feasibility.
4. Preparing a written report on the study conducted for presentation to the department.
5. Seminar as oral presentation in front of a departmental assessment & evaluation committee.

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
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Final Year B.Tech. (Electronics and Computer Engineering), Semester-VIII

22ECU8PR3L: Project Phase II / On Job Training (OJT)

Teaching Scheme		**Examination Scheme**	
Lectures	-	**ESE**	-
Practical	4 Hours/week	**ICA**	50 Marks
Credits	2	**OE**	50 Marks

Introduction:

Project based learning is a paradigm which is becoming time-honoured now a days. To keep abreast with this, Project course is included in the curriculum which is spread over both semesters of final year. For this course students carry out a project as a team that allows them to demonstrate their abilities and to develop skills within their chosen area of interest. Hardware realization as well software simulation projects with focus on design and research aspects are accepted. Also communicating effectively, both in oral and written form is an important skill for engineering graduates in many different contexts.

Course Prerequisite:

Student shall have technical competency as well as behavioural facet to carry project as a part of a team. He shall have an adept knowledge of hardware and software architecture and associated programming skills. He shall also possess necessary technical report writing skills, presentation skills and shall have proficiency in office software for word processing and presentation.

Course Objectives:

1. To implement the proposed design methodology to solve selected problem.
2. To make students evaluate and analyze performance of the solution for quality assurance and compliances.
3. Able to work effectively in a team environment, communicate technical ideas clearly through oral and written means, and maintain comprehensive documentation of the project activities.
4. To develop students' ability to effectively communicate their project outcomes, methodologies, and technical contributions through both well-structured written reports and oral presentations supported by appropriate visual aids, targeting a technical audience

Course Outcomes:

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

1. Able to implement the proposed design methodology to develop and realize a working solution for the selected problem
2. Able to evaluate and analyze the performance of the developed solution to ensure quality and compliance with relevant standards
3. Demonstrate teamwork, interpersonal communication, and documentation skills in coordinating and executing project tasks collaboratively.
4. Able to communicate project work effectively by preparing a structured technical report and delivering a clear, organized oral presentation using appropriate visual aids for a technical audience.

Internal Continuous Assessment (ICA)

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

1. In depth study of the topic assigned in the light of the report prepared under project – I
2. Review and finalization of the approach to the problem relating to the assigned topic
3. Preparing an action plan for conducting the investigation, including team work;
4. Detailed analysis/modelling/simulation/design/problem solving/experiment as needed
5. Final development of product/process, testing, results, conclusions and future directions
6. Preparing a paper for conference presentation/publication in journals, if possible
7. Preparing a project document in the standard format for being evaluated by the department.
8. Final seminar presentation before a departmental committee

22ECU8IN4L: Internship/ On Job Training (OJT)

Teaching Scheme		**Examination Scheme**	
Lectures	-	**ESE**	-
Practical	20 Hours/week	**ICA**	100 Marks
Credits	10	**OE**	100 Marks

Introduction:

The purpose of the Internship Program is to provide each student practical experience in a standard work environment. Success in this job will help ensure development of skills necessary for a lasting and rewarding career in the future.

Internship provides the student with an opportunity to gain knowledge and skills from a planned work experience in the student's chosen career field. In addition to meeting Core Learning Outcomes, jointly developed Specific Learning Outcomes. Internship placements are directly related to the student's program of study and provide learning experiences not available in the classroom setting. Internships provide entry-level, career-related experience, and workplace competencies that employer's value when hiring new employees. Internships may also be used as an opportunity to explore career fields. Students must meet with the Internship & Apprenticeship Coordinator prior to registering.

Course Prerequisite:

Student must be registered before you begin working with internship. The internship should be in a creative industry that relates to your program of study and professional goals. Students must remain at the internship worksite placement for the agreed upon period for which they are registered.

Course Objectives:

1. To strengthen the association of students with industries.
2. To create awareness amongst the students the recent trends of engineering in industries.
3. To enable students to apply engineering principles to real-world projects and problems.
4. To provide students with exposure to the professional engineering environment and industry standards.

Course Outcomes:

After completion of the internship students will be able:

1. Apply theoretical knowledge to practical problems in the workplace environment.
2. Demonstrate professional skills such as communication, teamwork, punctuality, and responsibility.
3. Analyse and solve technical problems encountered during the internship using appropriate engineering tools and techniques.
4. Prepare technical reports and presentations reflecting the work carried out during the internship.

Internal Continuous Assessment (ICA)
Assessment method

Student has to complete an internship of minimum two months duration at industry during Final Year Sem VIII. Work done by the student at the industry and related report will be accepted as 'Internship Report'.

After completion of Internship, the student should prepare a comprehensive report which represents leaning during internship period. The student may contact, if required, his Industrial Supervisor / HOD / TPO for assigning special topics and problems and should prepare the final report on the assigned topics. The training report should be signed by the Internship Supervisor and HOD.

The student shall give a seminar based on his internship report on demand, before the expert committee constituted by the concerned department as per norms of the institute.

The evaluation will be based on the following criteria:

- Proper presentation skill.
- Effectiveness of presentation.
- Depth of knowledge and skills.
- Content of internship report.
- External Oral Examination.