D Y PATIL
COLLEGE of
ENGINEERING & TECHNOLOGY
(AN AUTONOMOUS INSTITUTE)
KASABA BAWADA, KOLHAPUR

D. Y. Patil College of Engineering and Technology,

Kasaba Bawada Kolhapur

(An Autonomous Institute)

NBA Accredited

NAAC Accredited with 'A' Grade

Structure

of

M. Tech. in Electronics & Telecommunication Engineering

Department of Electronics & Telecommunication Engineering

2023-24

M. Tech. E&TC Scheme of Teaching and Examination w. e. f. A. Y. 2023-2024

(As Per National Education Policy 2020)

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR
Teaching and Evaluation Scheme from Year 2023-24
First Year M. Tech. - Electronics & Telecommunication Engineering
SEMESTER-I

Sr. No.	Course Code	Course Type	Name of the Course	TEACHING SCHEME			CREDITS	Total Marks	Evaluation Scheme			
				L	T	P			Type	Max. Marks	Minimum Marks For Passing	
1	232ETCL501	PCC	Random Processes	3	1	-	4	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
2	232ETCL502	PCC	Embedded System Design & Linux	3	-	-	3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
3	232ETCL503	PCC	Wireless & Mobile Communication	3	-	-	3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
4	232ETCL504 -5	PEC	Elective – I	3	1	-	4	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
5	232ETCP506	PCC	Embedded System Design & Linux Lab	-	-	2	1	25	ISE	25	10	10
6	232ETCP507	PCC	Wireless & Mobile Communication Lab	-	-	2	1	25	ISE	25	10	10
7	232ETCP508	PCC	Simulation Lab	-	-	2	1	50	ISE	50	20	20
8	232ETCP509	ELC	Seminar-I	-	-	2	1	50	ISE	50	20	20
9	232ETCL510	LLC	Stress Management by Yoga*	1	-	2	2	50	ESE	50	20	20
10	232ETCL511	HSSM	Pedagogic Studies	1	1	-	2	50	ISE	50	20	20
TOTAL				**14**	**3**	**10**	**22**	**650**				

NOTE:- * LLC Course - Stress Management by Yoga: ESE Examination of 50 Marks is to be conducted in online mode through MCQ by Central Examination Cell.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.

D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR
Teaching and Evaluation Scheme from Year 2023-24
First Year M. Tech. - Electronics & Telecommunication Engineering
SEMESTER-II

Sr. No.	Course Code	Course Type	Name of the Course	TEACHING SCHEME			CREDITS	Total Marks	Evaluation Scheme			
				L	T	P			Type	Max. Marks	Minimum Marks For Passing	
1	232ETCL512	PCC	Patten recognition and Machine Learning	3	-	-	3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
2	232ETCL513	PCC	Research Methodology & IPR	3	-	-	3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
3	232ETCL514-15	PEC	Elective – II	3	1	-	4	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
4	232ETCL516-17	PEC	Elective – III	3	1	-	4	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
5	232ETCL518	VSEC	Designing with PSoC	3	-	-	3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
6	232ETCL519	OEC	**Open Elective** –I (SWAYAM /NPTEL)	3	-	-	3	100	ESE	100	40	40
7	232ETCP520	PCC	Patten recognition and Machine Learning Lab	-	-	2	1	25	ISE	25	10	10
8	232ETCP521	ELC	Seminar II	-	-	2	1	50	ISE	50	20	20
TOTAL				18	2	4	22	675				

NOTE:- For Open Elective-I: The students are to study on their own by registering to SWAYAM /NPTEL Portal for the course which is multidisciplinary in nature(other than the course related to E & TC Stream). The student should complete the course assignments and appear the Examination conducted by SWAYAM /NPTEL. ESE Marks will be mapped as per the score mentioned on the SWAYAM /NPTEL Course completion certificate issued by SWAYAM /NPTEL.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR
Teaching and Evaluation Scheme from Year 2023-24
First Year M.Tech. - Electronics & Telecommunication Engineering
Exit Courses

Sr. No	Course Code	Name of the Course	Credits	
1	232ETCP522	Cisco Certified Network Associate (CCNA)	6	Any one Online/Offline Certification Courses
2	232ETCP523	Software Testing	6	
3	232ETCP524	Internship	2	Mandatory

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR
Teaching and Evaluation Scheme from Year 2024-25
Second Year M. Tech. - Electronics & Telecommunication Engineering
SEMESTER - III

Sr. No.	Course Code	Course Type	Name of the Course	TEACHING SCHEME			CREDITS	Total Marks	Evaluation Scheme			
				L	T	P			Type	Max. Marks	Minimum Marks For Passing	
1	232ETCL601	OEC	Open Elective –II (SWAYAM /NPTEL)	3	-	-	3	100	ESE	100	40	40
2	232ETCP602	ELC	Seminar-III	-	-	2	1	50	ISE	50	20	20
3	232ETCP603	ELC	Dissertation Phase – I	-	-	28	14	200	ISE	100	40	40
									ESE-POE	100	40	40
TOTAL				**3**	**-**	**30**	**18**	**350**				

NOTE:- For Open Elective-II: The students are to study on their own by registering to SWAYAM /NPTEL Portal for the course which is multidisciplinary in nature(other than the course related to E & TC Stream). The student should complete the course assignments and appear the Examination conducted by SWAYAM /NPTEL. ESE Marks will be mapped as per the score mentioned on the SWAYAM /NPTEL Course completion certificate issued by SWAYAM /NPTEL.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR
Teaching and Evaluation Scheme from Year 2024-25
Second Year M. Tech. - Electronics & Telecommunication Engineering
SEMESTER - IV

Sr. No.	Course Code	Course Type	Name of the Course	TEACHING SCHEME			CREDITS	Total Marks	Evaluation Scheme			
				L	T	P			Type	Max. Marks	Minimum Marks For Passing	
1	232ETCP604	ELC	Dissertation Phase– II	-	-	36	18	300	ISE	100	40	40
									ESE-POE	200	80	80
TOTAL				0	0	36	18	300				

Program Electives:

Sr. No.	Elective – I	Course Code	Elective – II	Course Code	Elective – III	Course Code
1	Internet of Things	232ETCL504	Error Control Coding Techniques	232ETCL514	Wireless Sensor Networks	232ETCL
2	Application Specific Integrated Circuit	232ETCL505	Network Security & Cryptography	232ETCL515	Multiple Input Multiple Output	232ETCL

Note:

1) Tutorials and practical shall be conducted in batches with batch size of 9 students maximum.
2) For Seminar-I/II/III, work load will be for one student.
3) Dissertation Phase I & Dissertation phase II work load will be for one student.
4) Open Elective course (OEC) should be self-learning Online multidisciplinary and it should be completed before the end of respective semester. The course must be of minimum 8/12 weeks duration. The student must appear for Online Certification Examination and produce its certificate.
5) ISE: In Semester Evaluation, MSE: Mid Semester Examination, ESE: End Semester Examination

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

EVALUATION METHODS:

1) **In Semester Evaluation (ISE-Theory) 20 marks:** ISE-1 and ISE-2 can be done by using following modes
    1) Online test
    2) Surprise test
    3) Open book-test
    4) Self-Study
    5) Self-learning topic
    6) Case study
    7) Demonstrations
    8) Seminars
    9) Assignments
    10) Active learning methods

    ISE (Lab) 25 marks: Lab assessment is to be done using continuous assessment method in which faculty has to evaluate student's performance based upon defined rubrics only and shown to the students

2) **Mid Semester Examination (MSE)** will be conducted for 30 marks

3) **End Semester Examination (ESE) for 50 marks:-** ESE will be conducted on entire syllabus for 50 marks for duration of 2 hours.

Total Credits

Sem I	Sem II	Sem III	Sem IV	Total Credits
22	22	18	18	80

Total Credits as per vertices

PCC	PEC	OEC	VSEC	HSSM	ELC	LLC	Total
20	12	6	3	2	35	2	80

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

First Year M.Tech Curriculum

w. e. f. 2023-2024

Course Title: Random Processes	
Course Code: 232ETCL501	**Semester** : I
Teaching Scheme : L-T-P :3-1-0	**Credit**: 4
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description:

This course introduces the fundamental concepts of probability theory, random processes, queuing theory and Markov chain. These are the essential building blocks of any random system, used in telecommunications network, hospital waiting list, transport system, etc.

Course Objectives:

1	To develop the logical concepts of probability theory.
2	To understand basic concepts of Random variables & Random Processes.
3	To Study concept of Markov Chain and Queuing Theory.

Course Outcomes (COs):

At the end of the course the student will be able to:

501.1	Solve Probability Problems
501.2	Apply statistical measures in Practical problems
501.3	Apply Markov Chain & Queuing Theory to solve Problems

Prerequisite:	Basic Math's, Set Theory

N.S.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
501.1	3	2	3	3	2								2	1	L3
501.2	2	2	3	3	2								2	2	L3
501.3	3	3	3	3	2								2	2	L3

Content	Hrs
Unit 1 –:Probability Theory The concept of Probability, the axioms of Probability, sample space and events, Conditional probability and Bay's theorem, Independence of events, Bernoulli trails	7
Unit 2 -: Random Variables Introduction to Random Variables, Discrete Random Variable, Continuous Random Variable, Expectation of Random Variable, Moments of Random Variable (mean, mode variance, skewness, Kurtosis).	7
Unit 3 –: Multiple Random Variables Cumulative distribution function and probability density function of single and multiple Random Variables, statistical properties, Jointly distributed Gaussian random variables, Conditional probability density, properties of sum of random variables, Central limit theorem, Estimate of population means, Expected value and variance and covariance.	7
Unit No. 4 -: Random Processes & Spectral Density Classification of Processes, Properties, Auto correlation and cross correlation Function, Estimate of auto correlation function. Spectral Density: Definition, Properties, white noise, Estimation of auto- correlation function using frequency domain technique, Estimate of spectral density, cross spectral density and its estimation, coherence.	7

Unit 5 –: Markov Chain Chapman Kolmogorov equation, Classification of states, Limiting probabilities, Stability of Markov system, Reducible chains, Markov chains with continuous state space.	7
Unit 6 -: Queuing Theory Elements of Queuing System ,Little's Formula, M/M/1 Queue, M/M/c Queue, Erlang delay formula, Finite source queue, Multi server system	7

Note:-Minimum Twelve tutorials should be performed on entire syllabus.

References:

1) Introduction to probability Models, Sheldon M. Ross, Academic Press
2) Probability and Random Processes for Electrical Engg., Alberto Lean, Pearson.
3) Probability, Random Variables and Stochastic Processes, Athanasios Papoulis, S. Unnikrishna Pillai, PHI
4) Samuel Greenguard, "Internet of things", MIT Press, 2015.

NPTEL Course:

Queuing theory: https://archive.nptel.ac.in/courses/111/103/111103159

Probability theory and applications: https://archive.nptel.ac.in/courses/111/104/111104079/

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

First Year M.Tech. Curriculum

w.e.f. 2023-2024

Course Title: Embedded System Design & Linux	
Course Code: 232ETCL502	**Semester** : I
Teaching Scheme : L-T-P :3-0-0	**Credit**: 3
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description:

This course aims to provide exposure to the advanced microcontrollers such as ARM 1768 cortex M3, M4 series and Embedded Linux.

Course Objectives:

1	Understand ARM processor core architecture along with on chip peripherals available on various embedded Cortex- M processors.
2	Understand interrupts and its programming with peripherals.
3	Develop small embedded system by using the ARM processor core based systems & its software.
4	Use EDA tools to design embedded system PCB.
5	Install and use the embedded Linux operating system.
6	learn the fundamentals of Linux as applied to embedded hardware.

Course Outcomes (COs):

At the end of the course the student will be able to:

502.1	Understand cortex-M processor architecture and its features.
502.2	Write & execute embedded C programs for on chip peripherals and its interrupts.
502.3	Analyse the embedded system hardware.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

502.4	Analyse the embedded system software.
502.5	Apply the basic concepts of Linux for various case studies.
502.6	Apply the various Linux commands and shell scripting for basic administration.

Prerequisite:	Microprocessors/Microcontroller, Operating system, C Programming

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
502.1	1	1	1		2								1	1	L2
502.2	2	2	2		2								1	1	L3
502.3	2	2	2	2	2								2	2	L4
502.4		2	2	2	2								2	2	L4
502.5			2		2										L3
502.6			2		2										L3

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Contents	Hrs
Unit 1: ARM Cortex-M Architecture and programming ARM Cortex M3/M4 Architecture, registers, status, clock generation, memory organization, instruction set, programmers model-registers, operating modes, programming	6
Unit 2 –Cortex M CPU Interrupts Nested vectored interrupt controller(NVIC), vector table, interrupt priorities, interrupt inputs & pending behaviour, fault exceptions, supervisor and pendable service call, systick timer, interrupt sequences, exits, tail chaining, interrupt latency, start up file, initialization of peripheral interrupts, interrupt programming	6
Unit 3 –ARM Peripherals and programming(ARM LPC 1768) On chip peripherals-features , interfacing & programming- GPIO,RTC, WATCHDOG, I2C, I2S ADC & SPI, repetitive interrupt timer, PWM, CAN bus, DMA, writing LCD drivers, drivers for serial port communication	9
Unit 4 –Embedded system design & testing Designing embedded system with cortex M3/M4 processors with SPI,UART,ADC,DAC,PWM Peripherals, hardware design issues, selection of electronic components, reading schematics, datasheets, footprint of different components, EDA tool for PCB design, hierarchical design, schematic & board layout design	9
Unit 5 –Introduction to Linux Linux Distributions, Open source Software, GPL, Embedded Linux Boards used in Industry/Market, Important Accessories of Linux boards available/used in industry, Development Setup for Embedded Linux, OS installation, init process, initrd, boot loaders, lilo and GRUB boot loaders, Case studies of Embedded Linux Based Systems	6
Unit 6- Linux file system and commands Linux File System, Permissions, CLI and Linux Shells, Linux Commands, Linux concepts, Shell Script, Linux commands for file and process management. Linux Programming, Multi-file C programming Using make utility, Make file, GNU debugger. Linux Kernel	6

References books:

1. The definitive guide to ARM Cortex-M3, Joseph Yiu, Elsevier, 2nd Edition
2. Embedded System Design, Frank Vahid and Tony Givargis, Wiley
3. Embedded Linux Primer: A Practical Real-World Approach, Christopher Hallinan,PrenticeHall;1st edition 2006

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

4. Beginning Linux Programming, Richard Stones, Neil Matthew Wiley; Fourth edition(2008)
5. ARM System Developer's Guide: Designing and Optimizing, Sloss Andrew N, Symes Dominic, Wright Chris, Morgan Kaufman Publication
6. Steve furber, "ARM System-on-Chip Architecture", Pearson Education
7. Technical references and user manuals on www.arm.com, NXP Semiconductor

Online Resources:

1. www.nxp.com and Texas Instruments www.ti.com,
2. ST Microelectronics www.st.com.

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

First Year M.Tech Curriculum

w.e.f. 2023-2024

Course Title: Wireless & Mobile Communication	
Course Code: 232ETCL503	**Semester** : VIII
Teaching Scheme : L-T-P :3-0-0	**Credit**: 3
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description:

This course offers an insight into the concepts of mobile and wireless data communication technologies. It enables the student to understand the emerging technologies of wireless and mobile communications and simulate them.

Course Objectives:

1	To provide the students with the fundamental concepts of wireless communication
2	To provide an analytical perspective on mobile radio Propagation models
3	To train the students to understand the architecture and operation of various IEEE standards
4	To provide the students with the various technologies in mobile data networks
5	To explore case study for recent technologies

Course Outcomes (COs):

At the end of the course the student will be able to:

503.1	To explore fundamentals of wireless technologies cellular system design concepts
503.2	Identify and analyse various multipath fading schemes
503.3	Familiar with some of the existing and emerging wireless Standards

H.O.D.

DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

503.4	Demonstrate various data networking technologies and their specifications
503.5	Develop the awareness about recent trends in wireless & mobile communication

Prerequisite:	Communication Engineering

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
503.1	1	1	1	1									1	1	L2
503.2	1	2	2	2	1								1	1	L3
503.3	2	2	2	2	1								1	1	L3
503.4	2	2	2	2	1								1	1	L3
503.5	2	2	2	2	1								1	1	L3

Content	Hrs
Unit 1: Introduction To Wireless Communication Systems Evolution of mobile radio communications, examples of wireless communication systems-paging systems, cordless telephone systems, cellular telephone systems, comparison of common wireless communication systems, trends in cellular radio	7

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech

and personal communications. Second generation (2G) cellular networks, third generation (3G) wireless networks, wireless local loop (WLL) and LMDS, wireless local area networks (WLANs), Bluetooth and personal area networks (PANs).	
Unit 2: Mobile Radio Propagation -i Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnel Zone Geo metry, Knife- edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models-Longley Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models- Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.	8
Unit 3: Mobile Radio Propagation -ii Mobile Radio Propagation: Small –Scale Fading and Multipath Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel-Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.	8

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.

Unit 4: WI-FI And The IEEE 802.11 Wireless LAN Standards IEEE 802 Architecture, IEEE 802.11 Architecture and Services, 802.11Medium Access Control, 802.11 Physical Layer, Other IEEE 802.11 Standards, Wi-Fi Protected Access. BLUETOOTH AND IEEE 802.15: Overview, radio specification, baseband specification, link manager specification, logical link control and adaptation protocol, IEEE 802.15.	7
Unit 5: Mobile Data Networks Introduction, data oriented CDPD network, GPRS and higher data rates, short messaging service in GSM, mobile application protocols. WIRELESS ATM & HIPERLAN: Introduction, Wireless ATM, HIPERLAN, HIPERLAN-2.	7
Unit 6: IEEE Explore Case Study 6G Wireless Communication Systems: Applications, Requirements, Technologies, Challenges, and Research Directions	5

Text Books:

1. Theodore S. Rappaport (2002), Wireless Communications -Principles Practice,2nd edition, Prentice Hall of India, New Delhi.
2. William Stallings (2009), Wireless Communications and Networks,2nd edition, Pearson Education, India.
3. Kaveh PahLaven, Prashanth Krishna Murthy (2007), Principles of Wireless Networks -A Unified Approach, Pearson Education, India.

Reference Books:

1. Dr. Kamilo Feher (2003), Wireless Digital Communications, Prentice Hall of India, New Delhi.
2. Jochen Schiller (2009), Mobile Communications, 2nd edition, Pearson Education, India.
3. Andreas F. Molisch (2006), Wireless Communications, Wiley –India, New Delhi.

Online Resource:

https://ieeexplore.ieee.org/abstract/document/9144301

H.O.D.
DEPARTMENT OF ELECTRONICS EN
D. Y. Patil College of Engg. & Tech
Kasaba Bawada, Kolhapur - 416 00

First Year M.Tech Curriculum

w. e. f. 2023-2024

Course Title: Internet of Things (Elective- I)	
Course Code: 232ETCL504	**Semester** : VIII
Teaching Scheme : L-T-P :3-1-0	**Credit**: 4
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description:

The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the middleware for Internet of Things. To understand the concepts of Web of Things

Course Objectives:

1	Understand fundamentals IOT.
2	To gain the knowledge of IOT protocols, applications and wireless technology
3	To gain the knowledge of WOT

Course Outcomes (COs):

At the end of the course the student will be able to:

504.1	Understand The Different Mechanisms And Key Technologies Of IOT
504.2	Understand The Different Protocols Of IOT
504.3	Understand The Application Areas Of IOT
504.4	Understand the wireless technology and Web of things used for IOT

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

Prerequisite:	Basic knowledge of computer, Internet, controllers and different languages.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
504.1	3		2	1	2	1							1	1	L2
504.2					3								2	2	L2
504.3	1	2		1	3	1							1	1	L3
504.4	1	1	2	1	1	2							2	2	L3

Content	Hrs
Unit 1: INTRODUCTION : Overviews and Motivations, Examples of Applications,IPv6 Role, Areas of Development and Standardization, Scope of Present Investigation **INTERNET OF THINGS DEFINITION AND FRAMEWORKS**: IoT Definitions, General Observations, ITU-T Views, Working Definition, IoT Frame works, Basic Nodal Capabilities.	7
Unit 2: FUNDAMENTAL IoT MECHANISMS AND KEY TECHNOLOGIES : Identification of IoT Objects and Services, Structural Aspects of the IoT, Environment Characteristic's, Traffic Characteristic's , scalability, Interoperability, Security and Privacy, Open Architecture, Key IoT Technologies, Device Intelligence, Communication Capabilities, Mobility Support, Device Power, Sensor Technology, RFID Technology, Satellite Technology.	7
Unit 3: EVOLVING IoT STANDARDS : Overview and Approaches, IETF IPv6 Routing Protocol for RPL Roll, Constrained Application Protocol (CoAP), Background, Messaging Model, Request / Response Model, Intermediaries and Caching, Representational State Transfer (REST), ETSI	7

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.

M@M, Third- Generation Partnership Project Service Requirements for Machine-Type Communications, Approach, Architectural Reference Model for MTC, CENELEC, IETF IPv6 Over Low power WPAN (6LoWPAN),ZigBee IP (ZIP), IP in Smart Objects (IPSO)	
Unit 4: INTERNET OF THINGS APPLICATIONS :Overview, Smart metering / Advanced Metering Infrastructure, e- Health / Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Tracking (Following and Monitoring Mobile Objects),Over-The- Air- Passive Surveillance / Ring of Steel, Control Application Examples.	7
Unit 5: WIRELESS TECHNOLOGIES FOR THE IoT: WPAN Technologies for IoT/M2M, Zigbee / IEEE802.15.4, Radio frequency for Consumer Electronics (RF4CE),Bluetooth and its Low Energy Profile, IEEE 802.15.6 WBANs,IEEE802.15 WPAN TG4j MBANs, ETSI TR 101 557, NFC, Dedicated Short range Communication (DSRC) and Related Protocols, Comparison of WPAN Technologies, Cellular and Mobile Network Technologies for IoT/ M2M, Overview and Motivations, Universal Mobile Telecommunications System, LTE	7
Unit 6: WEB OF THINGS - Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT. Architecture – WoT Portals and Business Intelligence.	7

Note:- Minimum twelve tutorials should be performed on entire syllabus.

Text Books:

1 Daniel Minoli "Building the Internet of Thing with IPv6 and MIPv6"

2. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.

3. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.

4. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a HighlyConnected World", Cambridge University Press, 2010.

5. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key Applications and Protocols", Wiley, 2012.

References:

1. Vijay Madisetti and Arsh deep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014

2.Francis da Costa, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

3. CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

First Year M.Tech Curriculum

w.e.f. 2023-2024

Course Title: Application Specific Integrated Circuit (ASIC) Design (Elective- I)	
Course Code : 232ETCL505	**Semester :** I
Teaching Scheme : L-T-P : 3-1-0	**Credits :** 4
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks :** 50

Course Description:

An application-specific integrated circuit (ASIC) is an integrated circuit customized for a particular use, rather than intended for general-purpose use. In this course, the reader is introduced to various ASIC architectures, ASIC design flow, issues in ASIC design and testing of ASICs and also about programmable logic arrays.

Course Objectives:

1	To learn the fundamentals of ASIC and its design methods
2	To gain knowledge on programmable architectures for ASICs
3	To understand the physical design of ASIC

Course Outcomes (COs): At the end of the course the student should be able to:

505.1	To learn the fundamentals of ASIC and its design methods
505.2	To gain knowledge on programmable architectures for ASICs & physical design of ASIC
505.3	To prepare the student to be an entry level industrial standard cell ASIC or FPGA designer
505.4	To give the student an understanding of issues and tools related to ASIC/FPGA design.

Prerequisite:	Basics of VLSI Design

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
505.1	3		3		2		2	3	2		1		1	2	L3
505.2	2		3				3		2				2	2	L3
505.3	2	3	2				2	1	1		3		1	2	L4
505.4	3	3					2	2	1		3		1	2	L4

Content	Hrs
Unit 1 -: Introduction to ASIC'S Types of ASICs ,Design flow, CMOS transistors CMOS Design rules, Combinational Logic Cell, Sequential logic cell, Data path logic cell, Transistors as Resistors, Transistor Parasitic, Capacitance, Logical effort, Library cell design, Library architecture	7
Unit 2 -: Programmable ASIC'S Anti-fuse , static RAM , EPROM and EEPROM technology , PREP benchmarks ,Actel ACT , Xilinx LCA ,Altera FLEX , Altera MAX, DC & AC inputs and outputs ,Clock & Power inputs , Xilinx I/O blocks.	7
Unit 3 –: Programmable ASIC Logic Cells Actel ACT ,Xilinx LCA , Xilinx EPLD , Altera MAX 5000 and 7000 , Altera MAX 9000 , Altera FLEX ,Design systems , Logic Synthesis , Half gate ASIC, Schematic entry , Low level design language , PLA tools ,EDIF, CFI design representation.	7
Unit 4 -: ASIC Floor Planning, Placement And Routing ASIC Construction: Physical Design, System Partitioning, FPGA Partitioning-Partitioning Methods. Floor planning and Placement: Floor planning- Placement-Physical Design Flow. Routing: Global Routing - Detailed Routing- Special	7

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

Routing. Design checks	
Unit 5 –: Optimization Algorithms Planar subset problem (PSP) ,single layer global routing single layer detailed routing wire length and bend minimization technique ,over the cell(OTC) Routing-multichip modules(MCM).	7
Unit 6-: Programmable Logic Arrays- Transistor chaining, Weinberger Arrays, Gate Matrix Layout,1D compaction,2D compaction	7

Note:- Minimum twelve tutorials should be performed on entire syllabus.

References:

1. M.J.S. Smith, —Application Specific Integrated Circuitsl, Pearson Education, 2008
2. Wayne Wolf, —FPGA-Based System Designl, Prentice Hall PTR, 2009.
3. Farzad Nekoogar and Faranak Nekoogar, —From ASICs to SOCs: A Practical Approachl, Prentice Hall PTR, 2003.
4. www.vhdl.org/rassp/vhdl/guidelines/DesignReq.pdf

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Final Year M.Tech. Curriculum

w.e.f. 2023-2024

Course Title: Embedded System Design & Linux Lab	
Course Code: 232ETCP506	**Semester** : I
Teaching Scheme : L-T-P :0-0-2	**Credit**: 1
Evaluation Scheme : ISE Marks : 25	

Course Description:

This lab course aims to provide exposure to the programming of advanced microcontrollers such as ARM 1768 cortex M3, M4 series and Embedded Linux. It also gives exposure to design and development of embedded hardware & software.

Course Objectives:

1	Understand ARM processor core architecture along with on chip peripherals available on LPC1768 embedded Cortex-M processors.
2	Understand interrupts and its programming with peripherals
3	Develop small embedded system by using the ARM processor core based systems and application software for it.
4	Use EDA tools to design embedded system PCB.
5	Install and use the embedded Linux operating system.
6	Learn the fundaments of Linux as applied to embedded hardware

Course Outcomes (COs):

At the end of the course the student will be able to:

506.1	Illustrate Cortex M processor architecture and its features.
506.2	Develop and execute programs for peripherals and interrupts.

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

506.3	Design and execute embedded system software.
506.4	Design embedded system PCB.
506.5	Apply the basic concepts of Linux for various case studies.
506.6	Apply the various Linux commands and shell scripting for basic administration.

Prerequisite:	Microcontrollers, Operating system, embedded C Programming, Linux

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
506.1	1	1	1		2								1	1	L2
506.2	2	2	2		2								1	1	L3
506.3	2	2	2	2	2								2	2	L4
506.4		2	2	2	2								2	2	L4
506.5			2		2										L3
506.6			2		2										L3

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

List of Experiments			
Expt. No.	**Name of Experiment**	**Type**	**Hours**
1.	Write Simple C Program with header files for array.	O	2
2.	Write C programs for GPIO and debug programs, observe variables.	O	2
3.	Write C programs for switch led interface for ARM LPC	O	2
4.	Write programs for UART in polling mode.	O	2
5.	Write programs for ADC in polled/Interrupt mode.	O	2
6.	Write programs for Timers of ARM LPC 1768.	O	2
7.	Write programs for interrupt of ARM LPC 1768.	O	2
8.	Write Programs for RTC & LCD using ARM LPC 1768.	O	2
9.	Write Programs for PWM LED fade for ARM LPC 1768.	O	2
10.	Write Programs for EEPROM byte R/W for ARM LPC	O	2
11.	Design Embedded system using various peripherals.	S	2
12.	Design PCB schematic for embedded system using	S	2
13.	Design Layout for schematic generated in Exp. 11	S	2
14.	Write program using the basic concepts of embedded Linux for various case studies.	O	2
15.	Write, compile multi-file, multi-threaded programs using make and debug using gdb.	O	2

S: indicates Study type O: Operational type

Note:- Minimum twelve experiments of the above should be conducted.

References books:

1. The definitive guide to ARM Cortex-M3, Joseph Yiu, Elsevier, 2nd Edition
2. Embedded System Design, Frank Vahid and Tony Givargis, Wiley
3. Embedded Linux Primer: A Practical Real-World Approach, Christopher Hallinan,PrenticeHall;1st edition 2006
4. Beginning Linux Programming, Richard Stones, Neil Matthew Wiley; Fourth edition(2008)
5. ARM System Developer's Guide: Designing and Optimizing, Sloss Andrew N, Symes Dominic, Wright Chris, Morgan Kaufman Publication

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

6. Rigid Flex PCB design– Ben Jordan
7. Technical references and user manuals on www.arm.com, NXP Semiconductor
8. User and reference guide of LPC1768

Online Resources:

1. www.nxp.com and Texas Instruments www.ti.com,
2. ST Microelectronics www.st.com.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

First Year M. Tech. Curriculum

w.e.f. 2023-2024

Course Title: Wireless & Mobile Communication Lab	
Course Code: 232ETCP507	**Semester** : I
Teaching Scheme : L-T-P :0-0-2	**Credit**: 1
Evaluation Scheme : ISE Marks : 25	ESE POE: NA

Course Description:

The course includes experiments based on wireless and mobile communication. This lab exposes the students to various wireless communication topics such as pathloss, beamwidth, frequency reuse handover etc.

Course Objectives:

1	To introduce the concepts of wireless communication channel & models.
2	To Evaluate the performance of digital communication parameters
3	To understand techniques to improve the performance of wireless systems using modern tools
4	To understand the behaviour of communication systems under different conditions

Course Outcomes (COs):

At the end of the course the student will be able to:

507.1	Determine Pathloss effects
507.2	Apply the knowledge to study various concepts in wireless communication systems

H.O.D.
DEPARTMENT OF ELECTRONICS EN
D. Y. Patil College of Engg. & Tech
Kasaba Bawada, Kolhapur - 416 00

507.3	Determine characteristics of base station
507.4	Analyze the Single Input Single Output Communication System
507.5	Demonstrate the impact of delay spread on frequency selectivity

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
507.1	1	1	1	1	1								2	2	L2
507.2	2	2	2	2	1								2	2	L3
507.3	2	2	2	2	1								2	2	L3
507.4	2	2	2	2	1								2	2	L3
507.5	2	2	2	2	1								2	2	L3

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

List of Experiments			
Expt. No.	Name of Experiment	Type Hours	Type Hours
1	To demonstrate the path loss prediction	O	2
2	To observe the effect of shadowing on path loss formula	O	2
3	To find the 3dB beam width of a base station antenna	O	2
4	To calculate the probability that the received signal level crosses a certain sensitivity level	O	2
5	To understand the concept of co-channel interference and hence Signal to Interference and Noise Ratio	O	2
6	To understand the cellular frequency reuse concept	O	2
7	To understand the impact of many different parameters influence the downlink C/I ratio	O	2
8	To understand the handover mechanism	O	2
9	To study the outage probability, LCR & ADF in SISO for Selection Combining and MRC	O	2
10	To study the effect of delay spread on frequency selectivity	O	2
11	Implement MATLAB based simulation project to demonstrate application in wireless communication as a miniproject.	O	6

O: Operational type

Note:- Minimum twelve experiments of the above should be conducted.

Text Books:

1. Theodore S. Rappaport (2002), Wireless Communications -Principles Practice,2nd edition, Prentice Hall of India, New Delhi.
2. William Stallings (2009), Wireless Communications and Networks,2nd edition, Pearson Education, India.
3. Kaveh PahLaven, Prashanth Krishna Murthy (2007), Principles of Wireless Networks -A Unified Approach, Pearson Education, India.

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

Reference Books:

1. Dr. Kamilo Feher (2003), Wireless Digital Communications, Prentice Hall of India, New Delhi.
2. Jochen Schiller (2009), Mobile Communications, 2nd edition, Pearson Education, India.
3. Andreas F. Molisch (2006), Wireless Communications, Wiley –India, New Delhi.

Online Resource:

http://vlabs.iitkgp.ernet.in/fcmc/#

H.O.D.
DEPARTMENT OF ELECTRONICS E
D.Y. Patil College of Engg. & Tech
Kasaba Bawada, Kolhapur - 416 00

First Year M.Tech Curriculum

w.e.f. 2023-2024

Course Title: Simulation Lab	
Course Code: 232ETCP508	**Semester** : I
Teaching Scheme : L-T-P :0-0-2	**Credit**: 1
Evaluation Scheme : ISE: 50	

Course Description:

Python is one of the most popular and widely used programming languages in the world. The purpose of this program is to teach the student how to program in Python and prepare for a career in data science, AI, machine learning, and deep learning.

Course Objectives:

1	To develop problem solving skills and their implementation through basic python
2	To understand and implement concepts of decision making statements.
3	To understand & implement programs based on built in functions.
4	To implement programs based different data collection concepts.

Course Outcomes (COs):

At the end of the course the student will be able to:

508.1	Understand the python programming basics
508.2	Implement Python programs with conditionals and loops.
508.3	Implement built in functions to solve problems
508.4	Implement python list, tuple, set and dictionary collection concepts

H.O.D.
DEPARTMENT OF ELECTRONICS E
D. Y. Patil College of Engg. & Tech
Kasaba Bavada, Kolhapur - 416 00

Prerequisite:	Basic programming concepts

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
508.1	3	2	1	1	2									2	L2
508.2	3	3	2	2	2									1	L4
508.3	3	3	2	2	2									1	L4
508.4	3	2	2	2	2									1	L4

List of Experiments:

Expt. No.	Name of Experiment	Type Hours	Type Hours
1	Write a program to demonstrate different number data types in python	O	2
2	Write a program to perform different arithmetic operations on numbers in python	O	2
3	Write a program to create, concatenate and print a string and accessing sub-string from given string	O	2
4	Write a python script to print the current date in the fallowing format "Sun Oct 15 02:26:23 IST 2023"	O	2

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

5	Write a program to create, append and remove lists in python	O	2
6	Write a program to demonstrate working with tuples in python	O	2
7	Write a program to demonstrate working with dictionaries in python	O	2
8	Write a program to find the largest number among the three input numbers	O	2
9	Program to convert temperature in Celsius to Fahrenheit	O	2
10	Python program to construct the following pattern, using a nested for loop	O	2
11	Python script that prints prime numbers less than 20	O	2
12	Python program to find the factorial of a number using recursion	O	2
13	Python program that accepts the lengths of three sides of a triangle as input the program output should indicate whether or not the triangle ,is right triangle(recall from the Pythagorean theorem that in a right triangle ,the square of one side equals the sum of the squares of the other two sides)	O	2
14	Python program to define a module to find Fibonacci numbers and import the module to another program	O	2
15	Python program to define a module and import a specific function in that module to another program	O	2
16	Write a script named copyfile.py. This script should prompt the user for the names of two text files. the contents of the first file should be input and written to the second file	O	2
17	Python program that input a text file .the program should print all of the unique words in the file in alphabetical order.	O	2
18	Python program class to convert an integer to Roman numeral	O	2
19	Python program class to implement pow(x, n)	O	2
20	Python program class to reverse a string word by word.	O	2

O: Operational type

Note:- Minimum twelve experiments of the above should be conducted.

H.O.D.
DEPARTMENT OF ELECTRONICS EN
D. Y. Patil College of Engg. & Tech
Kasaba Bawada, Kolhapur - 416 00

Text Books:

1. Learning Python, Mark Lutz, Orielly, 3 Edition 2007.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson, 2017.

Reference Books:

1. Martin C. Brown, "Python: The Complete Reference", Tata McGraw Hill Publication, Edition 2018
2. Mark Lutz, "Learning Python", O'Reilly Publication, Edition 2013
3. Michael Dawson, "Python Programming for Absolute Beginner", Cengage Learning, Edition 2010

Online Resources:

1. http://greenteapress.com/wp/think-python/
2. https://nptel.ac.in/courses/106/106/106106182/

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

First Year M.Tech Curriculum

w.e.f. 2023-2024

Course Title: Seminar-I	
Course Code: 232ETCP509	**Semester** : I
Teaching Scheme : L-T-P :0-0-2	**Credit**: 1
Evaluation Scheme : ISE: 50	

Course Description:

This course aims to give exposure to the students for developing the presentation skills & delivery of the knowledge about latest trends in Electronics & Telecommunication Engg.

- Each student is required to deliver a seminar presentation on a domain and topic preferably from the area in which the student intends to work for his/her dissertation work.
- Preparation and presentation of a seminar is intended to investigate domain and identifying the topic for the dissertation work.
- The student needs to submit the detail seminar report on the domain and the topic identified.
- Students are expected to deliver a seminar during tenth week of the semester.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

First Year M.Tech Curriculum

w.e.f. 2023-2024

Course Title: Stress Management by Yoga	
Course Code: 232ETCL510	**Semester** : I
Teaching Scheme : L-T-P :1-0-2	**Credit**: 2
Evaluation Scheme : ISE: N.A.	**ESE Marks** : 50

Course Description:

This course will provide students to develop skill for peaceful body & mind for human health and how to cope with stress by applying daily yoga in our life.

Course Objectives:

1	To achieve overall health of body & mind
2	To apply yoga therapy for reducing stress.

Course Outcomes (COs):

At the end of the course the student will be able to:

510.1	Identify the yoga methods to become healthy.
510.2	Apply suitable yoga technique for reducing stress.

Prerequisite:	Human relationship

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
510.1						1	1	1	2	1		1	-	-	2
510.2						1	1	1	1	1		1	-	-	3

Content	Hrs
Unit 1: Introduction to yoga Types of yoga –Mantra yoga, Bhakti Yoga, Karma Yoga, Raja Yoga, Hath Yoga Five Tattvas, or Pancha-mahabhuta, What is prana and its types? Panch Kosha (five layers of our existence)	2
Unit 2: Stress & its effects Definition , Causes	2
Unit 3: Ashtanga Yoga 1. Yama (Five)- 2. Niyama(Five) 3. Asana 4. Pranayama 5. Pratyahara 6. Dharana 7. Dhyana 8. Samadhi	3
Unit 4: Pranayama (Breathing Techniques) 1. Bhastrika Pranayama 2 Kapal Bhati Pranayama 3 Bahaya Pranayama 4 Ujjayi 5 Anulom Vilom Pranayama 6 Bharamari Pranayama 7 Udgeeth Pranayama 8 Pranav Pranayama	2
Unit 5: Suryanamskar	2

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

Surya Namaskar is a sequence of 12 powerful yoga poses. Steps & benefits	
Unit 6: Yogik Sukshma Vyayam & Asana	3

Note:- Minimum twelve practical based on above should be conducted.

Text Books:

1. Pranayam Rahasya (English)by Divya Prakashan
2. Yog sadhana & chikistya Rahasya by Divya Prakashan
3. Raja Yoga by Swami Vivekananda

H.O.D.
DEPARTMENT OF ELECTRONICS EN
D. Y. Patil College of Engg. & Tech
Kasaba Bawada, Kolhapur - 416 00

First Year M.Tech Curriculum

w.e.f. 2023-2024

Course Title: Pedagogic Studies	
Course Code: 232ETCL511	**Semester** : I
Teaching Scheme : L-T-P :1-1-0	**Credit**: 2
Evaluation Scheme : ISE Marks : 50	**ESE Marks** : N.A.

Course Description:

This course introduces students to a range of pedagogic strategies applicable to all levels of learning, with a particular focus on flexible, diverse and inclusive student-centred pedagogical approaches. Focussing on skills for 21st century learners, students will model and reflect on pedagogic strategies and their theoretical justifications, and consider the critical importance of planning, trialling and reflecting on pedagogic strategies.

Course Objectives:

1	Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
2	Identify critical evidence gaps to guide the development

Course Outcomes (COs):

At the end of the course the student will be able to:

511.1	Understand What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
511.2	Understand what is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

511.3	Understand how can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Prerequisite:	None

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
511.1	1	2	1												L2
511.2	2	1	1												L2
511.3	2	1	2												L2

Content	Hrs
Unit 1: Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions.	3
Unit 2: Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.	2
Unit 3: Evidence on the effectiveness of pedagogical practices, Methodology for the in	2

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

depth stage: quality assessment of included studies. ,How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?	
Unit 4: Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies	3
Unit 5: Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes	2
Unit 6: Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.	2

Note:- Minimum twelve tutorials should be performed on entire syllabus.

Text Books:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2):245-261.

2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.

3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

Reference Books:

1.Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.

2. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education.

Oxford and Boston: Blackwell.

3. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.

Online Resources:

1. www.pratham.org/images/resource%20working%20paper%202.pdf.

H.O.D.
DEPARTMENT OF ELECTRONICS EN
D.Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

First Year M.Tech. Curriculum

w.e.f. 2023-2024

Course Title: Patten recognition and Machine Learning	
Course Code: 232ETCL512	**Semester** : II
Teaching Scheme : L-T-P :3-0-0	**Credit**: 3
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description: This course helps the students gain a solid introduction to the fundamentals of machine learning and explore a wide range of techniques, including supervised, unsupervised learning.

Course Objectives:

1	Familiarise with the fundamental concepts of machine learning
2	Introduce some algorithmic techniques developed for handling large amounts of data.
3	Emphasize both theoretical as well as practical aspects of various machine learning algorithms.

Course Outcomes (COs):

At the end of the course the student will be able to:

512.1	Develop an appreciation for what is involved in Learning models from data
512.2	Analyse a wide variety of learning algorithms
512.3	Analyse how to evaluate models generated from data
512.4	Apply the algorithms to a real problem, optimize the models learned.

Prerequisite:	Statistics & Linear Algebra

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
512.1	1	1	1	1	1								1	1	L2
512.2	1	2	2	2	2								1	1	L3
512.3	2	2	2	2	2								1	1	L3
512.4	2	2	2	2	2								1	1	L3

Content	Hrs
Unit 1: Introduction & Data Processing An Introduction to Machine Learning Demystifying Machine Learning ML – Applications Best Python libraries for Machine Learning, Introduction to Data in Machine Learning, Understanding Data Processing Data Cleaning Feature Scaling.	7
Unit 2: Classification and Regression Getting started with Classification Basic Concept of Classification Types of Regression Techniques Classification vs Regression Types of Learning, Gradient Descent algorithm and its variants, Linear regression	7
Unit 3: Logistic Regression, Naive Bayes Classifiers & Support Vector Introduction to Logistic Regression, Cost function in Logistic Regression Naive Bayes Classifiers, Support Vector Machines(SVMs) in Python, SVM Hyperparameter Tuning using GridSearchCV	7

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Unit 4: Decision Tree & Random Forest What is a Decision Tree? Decision Tree Terminologies, Attribute Selection Measures, Decision Tree algorithm Working with example, Strengths and Weaknesses of the Decision Tree Approach, Random forest model Out of Bag Score, and its advantages, disadvantages.	7
Unit 5: Clustering Algorithms K means Clustering, Mini Batch K-means clustering algorithm, Mean-Shift Clustering, DBSCAN Clustering, Hierarchical Clustering	7
Unit 6: Dimensionality Reduction Introduction to Dimensionality Reduction, Principal Component Analysis(PCA) Low-Rank Approximations, Overview of Linear Discriminant Analysis (LDA) Mathematical Explanation of Linear Discriminant Analysis (LDA), Generalized Discriminant Analysis (GDA), Independent Component Analysis	7

Text Books:

1. Machine Learning, Anuradha Srinivasaraghavan, and Vincy Joseph, Kindle Edition, 2020, WILEY.
2. Introduction to Machine Learning, Ethem Alpaydin, Second Edition, 2010, Prentice Hall of India.
3. Practical Machine Learning Sunila Gollapudi Packt Publishing Ltd

Reference Books:

1. Machine Learning by Tom M. Mitchell, International Edition 1997, McGraw Hill Education

Online Resource:

https://www.geeksforgeeks.org/machine-learning/?ref=lbp

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.

First Year M.Tech. Curriculum

w. e. f. 2023-2024

Course Title: Research Methodology & IPR	
Course Code: 232ETCL513	**Semester** : II
Teaching Scheme : L-T-P :3-0-0	**Credit**: 3
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description:

This course is introduced to understand how to define a problem for research work, how literature Survey is carried out. What is plagiarism and how it is checked. What are the research ethics? The course is also intended to understand the types of Intellectual Property Rights and the process of filing the IPRs

Course Objectives:

1	Understand and define different research problems, literature studies and approaches
2	Describe what Plagiarism is, and Research ethics.
3	Describe the concepts of Property, Intellectual Property rights and Process of Patenting and Development.

Course Outcomes (COs):

At the end of the course the student will be able to:

513.1	Understand research problem formulation and approaches of investigation of solutions for research problems.
513.2	Learn ethical practices to be followed in research and apply research methodology in case studies and acquire skills required for presentation of research outcomes.
513.3	Discover how IPR is regarded as a source of national wealth and mark of an economic leadership in context of global market scenario.
513.4	Summarize that it is an incentive for further research work and investment in R & D, leading to creation of new and better products and generation of economic and social benefits.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Prerequisite:	Digital Communication, Applied Mathematics

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
513.1	1	2	1										1	1	L1
513.2	1	2	2										1	2	L1
513.3	2	2	2										2	1	L2
513.4	1	1	2										1	2	L1

Content	Hrs
Unit 1-: Meaning of research problem: Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, necessary instrumentations.	7
Unit 2-: Effective literature studies approaches: Analysis, Use, Design of Experiments /Taguchi Method to plan a set of experiments or simulations or build prototype. Analyze your results and draw conclusions or Build Prototype, Test and Redesign.	7
Unit 3-: Plagiarism, Research ethics: Effective technical writing, how to write report, Paper. Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.	7

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

Unit 4-: Introduction to the concepts Property and Intellectual Property: Nature and Importance of Intellectual Property Rights, Objectives and Importance of understanding Intellectual Property Rights.	7
Unit 5-: Understanding the types of Intellectual Property Rights: Patents-Indian Patent Office and its Administration, Administration of Patent System –Patenting under Indian Patent Act, Patent Rights and its Scope, Licensing and transfer of technology, Patent information and database. Provisional and Non Provisional Patent Application and Specification, Plant Patenting, Idea Patenting, Integrated Circuits, Industrial Designs, Trademarks (Registered and unregistered trademarks), Copyrights, Traditional Knowledge, Geographical Indications, Trade Secrets, Case Studies	7
Unit 6-: New Developments in IPR, Process of Patenting and Development: Technological research, innovation, patenting, development, International Scenario: WIPO, TRIPs, Patenting under PCT.	7

References:

1. Aswani Kumar Bansal: Law of Trademarks in India
2. B L Wadehra : Law Relating to Patents, Trademarks, Copyright, Designs and Geographical Indications.
3. G.V.G Krishnamurthy, "The Law of Trademarks, Copyright, Patents and Design"
4. Satyawrat Ponkse, "The Management of Intellectual Property"
5. S K Roy Chaudhary & H K Saharay, " The Law of Trademarks, Copyright, Patents"
6. T. Ramappa, S. Chand, "Intellectual Property Rights under WTO"
7. Manual of "Patent Office Practice and Procedure"
8. WIPO: "WIPO Guide To Using Patent Information"
9. Halbert, Taylor & Francis, "Resisting Intellectual Property"
10. Mayall, "Industrial Design", Mc Graw Hill
11. Niebel, "Product Design", Mc Graw Hill
12. Asimov, "Introduction to Design", Prentice Hall
13. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age"

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

First Year M.Tech Curriculum

w. e. f. 2023-2024

Course Title: Error Control Coding Techniques (Elective- II)	
Course Code: 232ETCL514	**Semester** : II
Teaching Scheme : L-T-P :3-1-0	**Credit**: 4
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description:

Error-control codes form an integral part of all digital communications systems, and every communications engineer should have a good working knowledge of the theory underlying these codes. This course aims to introduce the fundamentals of error control coding techniques and application

Course Objectives:

1	To understand need and objective of Error Control Coding and mathematical concepts related to coding
2	To understand encoding & decoding techniques for Linear Block Codes and Cyclic Codes.
3	To understand the formulation and computation related to encoding & decoding of Binary BCH Code & RS Code.
4	To understand encoding & decoding procedure in Convolutional Codes and different algorithms associated with Convolutional Coding& iteratively codes

Course Outcomes (COs):

At the end of the course the student will be able to:

514.1	Understand identify the role of Error Control Coding techniques and mathematical concepts related to coding
514.2	Understand to Analyze & design the encoder & decoder for Linear Block Codes & Cyclic Codes.
514.3	Understand to Analyze & design the encoder & decoder for BCH & RS Code.
514.4	Analyze the concept of encoding& decoding for Convolutional codes and different algorithms associated with convolutional Coding & iteratively decoded codes.

Prerequisite:	Digital Communication, Applied Mathematics

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
514.1	3	2	3	3	2								2	1	L2
514.2	2	2	3	3	2								2	2	L2
514.3	2	3	3	3	1								2	2	L2
514.4	3	3	2	3									2	1	L4

Content	Hrs
Unit 1 -: Coding for Reliable Digital Transmission Types of Codes, modulation & coding, Error Control Coding: Need, Objectives, approaches, Types of Errors & Error control strategies, Performance measures. Introduction to Algebra: Definitions, Groups & fields, Binary field arithmetic, factorization of (Xn-1) over a finite field, Construction of Galois field GF (2m) and its basic properties, Computations, Vector spaces, Matrices.	7
Unit 2-: Linear block codes Introduction, Structure, Parameters, Generator & Parity Check Matrix, Encoding circuit, Syndrome & Error detection, Syndrome circuit, Distance Properties, Error detecting & Correction Capabilities, Standard Array & Syndrome decoding for (n,k) linear Block Code. Hamming Codes, Product codes, Repetition code, Hadamard codes (Wash Code), Dual Code, Shortened and Extended linear Codes, Reed Muller (RM) Codes.	7
Unit 3-: Cyclic codes: Algebraic structure, Polynomial representation of code word, Generator polynomial, Non-systematic & Systematic Cyclic Codes, Generator & Parity	7

H.O.D

DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Check Matrices for cyclic code, Structure of Cyclic Encoder & Syndrome calculator, Encoding of cyclic code using feedback shift register circuit, Syndrome computation and Error detection, Decoding of Cyclic code, Error- Trapping Decoding. Cyclic Redundancy Check Code, Cyclic Hamming Codes, Golay Code, Shortened Cyclic Codes.	
Unit 4-: BCH & RS Code: BCH Code: Primitive Element, Primitive Polynomial, Binary Primitive BCH Code, Minimal & Generator Polynomial for BCH Code, Decoding of BCH Code, Peterson-Gorenstein-Zierler decoder, Error Location & Error Evaluation polynomials, Implementation of Error Correction. RS Code: Introduction, Error correction capability of RS code, RS code in Non-systematic & Systematic form, Syndrome decoding, Error location & Error Evaluation Polynomials, Decoding of RS code & Non-binary BCH codes using the Berlekamp Algorithm.	7
Unit 5-: Convolution Codes: Introduction, Encoding of Convolutional Codes, Generator matrix, Convolutional code representation: Code Tree, State diagram & Trellis diagram, Structural & Distance properties of Convolutional codes, Transfer Function of Convolution Code. Optimum decoding of Convolutional Codes: Maximum Likelihood decoding, The Viterbi Algorithm, Sequential Decoding, Majority Logic Decoding.	7
Unit 6-: Turbo Code & Low Density parity check Codes (LDPC): Turbo Code: Introduction, Basic Turbo Encoding Structure, Decoding Algorithms: Maximum Posterior decoding Algorithm. Low Density Parity Check Codes (LDPC): Introduction, Construction, Tanner Graph, Decoding LDPC Code: Hard & Soft decoding.	7

Note:-Minimum twelve tutorials should be performed on entire syllabus.

References:

1. Shu Lin, Daniel J.Costello, Jr.,"Error Control Coding", II[nd] Edn 2011, Pearson Education.
2. Salvatore Gravano, "Introduction to Error Control Codes", South Asia Edition, Oxford University Press
3. W.CaryHuffman and Vera Pless, "Fundamentals of Error correcting Codes", First Edition, Cambridge University Press.
4. Todd K Moon,"Error Correction Coding", Wiley student, Edition 2006
5. Blahut R.E., "Algebraic codes for Data transmission", Cambridge University Press,2003
6. Bernard Sklar, Pabitra Kumar Ray, "Digital Communications Fundamentals and Applications," Pearson Publications, Second Edition, 2009.
7. William Ryan and Shu Lin, "Channel Codes: Classical and Modern", Cambridg University Press, 2009.
8. Peter Sweeney, "Error Control Coding", John Wiley & Sons, 2002.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

First Year M.Tech. Curriculum

w. e. f. 2023-2024

Course Title: Network Security & Cryptography (Elective- II)	
Course Code: 232ETCL515	**Semester** : II
Teaching Scheme : L-T-P :3-1-0	**Credit**: 4
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description:

This course aims to introduce the student to the areas of network security & cryptography. This course develops a basic understanding of the algorithms used to protect the users. The course emphasizes to give a basic understanding of attacks on cryptosystems with the aim of preventing the attacks.

Course Objectives:

1	Understand Block Cipher and DES principles.
2	Understand Symmetric Encryption Methods
3	Identify network security threat

Course Outcomes (COs):

At the end of the course the student will be able to:

515.1	Implement Cryptography methods on Network Security concepts and Application
515.2	Implement Symmetric methods
515.3	Implement Message authentication and Hash Functions
515.4	Identify the attacks and methods of web security

Prerequisite:	Computer Networks

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
515.1	3	2	3	3	2								1	1	L3
515.2	2	2	3	3	1								2	2	L3
515.3	2	2	3	3	1								2	2	L3
515.4	2	1	2	3									2	1	L2

Content	Hrs
Unit 1 – Overview: Services, Mechanisms, and attacks, The OSI Security Architecture, A model for network security, Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, and Steganography	7
Unit 2 – Block Ciphers and the Data Encryption Standard: Simplified DES, Block Cipher Principles, The Data Encryption Standard, Strength of DES, Differential Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.	7
Unit 3 –Contemporary symmetric Ciphers: Triple DES, Blowfish, RC5, Characteristics of Advanced Symmetric Block Ciphers, Confidentially using symmetric Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, and Random Number Generation	7

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Unit No. 4 - Public Key Cryptography and RSA: Principles of Public Key cryptosystems, The RSA Algorithm, Key Management, other Public Key Crypto systems key Management, Diffie-Hellman Key exchange	7
Unit 5 - Message Authentication and hash functions: Authentication Requirements, Authentication Function, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs. Hash Algorithms: MD5 Message Digest Algorithm, Secure Hash Algorithm. Digital signatures and Authentication protocols: Digital signatures, Authentication protocols and Digital signature Standard	7
Unit 6- Authentication Applications: Kerberos, X. 509 Authentication Service. Electronic Mail Security: Pretty Good Privacy, S/MIME, IP Security Overview, IP Security Architecture, Authentications, Header, Encapsulating Security Payload, Combining Security Associations, Key Management. Web Security: Web Security Considerations, Secure socket layer and Transport Layer security. Secure electronic transaction. System Security: Intruders, Intrusion Detection, password management. Malicious Software, Viruses, Viruses and Related Threats, Firewalls: Firewall Design Principles, Trusted systems.	7

Note:-Minimum twelve tutorials should be performed on entire syllabus.

References:

1. Willam Stallings, Cryptography and Network Security, Third Edition, Pearson Education
2. Network Algorithmic: An Interdisciplinary Approach to Designing Fastnet Devices George Varghese (Morgan Kaufmann Series in Networking)
3. Atul Kahate, Cryptography and Network Security, Tata Mc Graw hill, 2003

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

First Year M.Tech Curriculum

w.e.f. 2023-2024

Course Title: Wireless Sensor Networks (Elective-III)	
Course Code: 232ETCL516	**Semester** : II
Teaching Scheme : L-T-P :3-1-0	**Credit**: 4
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description:

This course provides exposure to the Wireless Sensor Networks which are emerging technology in today's era of IOT.

Course Objectives:

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

1	Design wireless sensor network system for different applications under consideration
2	Understand the hardware details of different types of sensors and select right type of sensor for various applications.
3	Understand radio standards and communication protocols used by wireless sensor network based systems.
4	Use operating systems and programming languages for wireless sensor nodes, performance of wireless sensor networks systems and platforms.
5	Handle special issues related to sensors like energy conservation and security challenges.

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Course Outcomes (COs):

At the end of the course the student will be able to:

516.1	Design techniques for wireless Sensor Network system.
516.2	Understand the hardware details of different sensors as per the need of applications
516.3	Understand radio standards and communication protocols used by wireless sensor network based systems.
516.4	Use operating systems and programming languages for wireless sensor nodes, performance of wireless sensor networks systems and platforms.
516.5	Handle special issues related to sensors like energy conservation and security challenges.

Prerequisite:	Wireless communication, Computer Network

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
516.1	3	2	2	2									1	2	L2
516.2	3	2	3	2									1	2	L2

H.O.D.
DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.

516.3	2	2	2	2								2	1	L3
516.4	2	2	2	2								2	2	L3
516.5	3	2	3	2								1	2	L3

Content	Hrs
Unit 1: Introduction and overview: Introduction and overview of sensor network architecture and its applications, sensor network comparison with Ad Hoc Networks, Sensor node architecture with hardware and software details.	7
Unit 2: Enabling technologies: Hardware: Examples like mica2, micaZ, telosB, cricket, Imote2, tmote, btnode, and SunSPOT, Software (Operating Systems): tinyOS,MANTIS, Contiki.	7
Unit 3: Programming tools: C, nesC. Performance comparison of wireless sensor networks simulation and experimental platforms like open source (ns-2) and commercial (QualNet, Opnet)	9
Unit 4: Overview of sensor network protocols: (details of at least 2 important protocol per layer):Physical, MAC and routing/ Network layer protocols, node discovery protocols, multi-hop and cluster based protocols, Fundamentals of 802.15.4, Bluetooth.	9
Unit 5: Data dissemination and processing: Differences compared with other database management systems, data storage; query processing.	5
Unit 6: Specialized features: Energy preservation and efficiency, security challenges, fault-tolerance, Issues related to Localization, connectivity and topology, Sensor deployment	5

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

mechanisms, cover age issues, sensor Web, sensor Grid, Open issues for future research and Enabling technologies in wireless sensor network	

Note:- Minimum twelve tutorials should be performed on entire syllabus

Text Books:

1. H. Karl and A. Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, India, 2012.

2. C. S. Raghavendra, K. M. Sivalingam, and T. Znati, Editors, "Wireless Sensor Networks", Springer Verlag, 1st Indian reprint, 2010.

Reference Books:

1. F. Zhao and L. Guibas, "Wireless Sensor Networks: An Information Processing Approach", Morgan Kaufmann, 1st Indian reprint, 2013.

2. Yingshu Li, MyT. Thai, Weili Wu, "Wireless sensor Network and Applications", Springer series on signals and communication technology, 2008.

H.O.D.
DEPARTMENT OF ELECTRONICS EN
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

First Year M.Tech Curriculum

w.e.f. 2023-2024

Course Title: Multiple Input Multiple Output System (Elective-III)	
Course Code: 232ETCL517	**Semester** : II
Teaching Scheme : L-T-P :3-1-0	**Credit**: 4
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description: This course covers the fundamentals of MIMO technology with multiple antennas at transmitter and receivers. Its helps to design wireless communication system

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

1	To understand the performance of MIMO system
2	To analyze various space time codes (STBC)
3	To understand the Alamouti schemes of channel estimation

Course Outcomes (COs):

At the end of the course the student will be able to:

517.1	Understand the basic concepts of MIMO system
517.2	Evaluate the performance of various space time coding schemes in different fading channel scenario
517.3	Solve the engineering problems related to space time coding using in MIMO-OFDM system in different fading channels

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Prerequisite:	Digital & Wireless Communication

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
517.1	3	2	2	2									1	2	L2
517.2	3	2	3	2									1	2	L4
517.3	2	2	2	2									2	1	L3

Content	Hrs
Unit 1: Introduction: MIMO wireless communication , M I M O channel and signal model , A fundamental trade-off, MIMO transceiver design, MIMO in wireless networks, MIMO in wireless standards. Equalizer Noise Enhancement, Equalizer Types, Folded Spectrum and ISI- Free Transmission, Linear Equalizers, Zero Forcing (ZF) Equalizers, Minimum Mean Square Error (MMSE) Equalizer, Maximum Likelihood Sequence Estimation., Decision- Feedback Equalization	7
Unit 2: Performance Limits Of Multiple-Input Multiple-Output Wire Less Communication Systems: MIMO System Model, Capacity in AWGN, Channel Side Information at Transmitter and Receiver, Capacity of Frequency-Selective Fading MIMO System Capacity Derivation, Capacity of MIMO Systems with Random Channel	7

H.O.D

DEPARTMENT OF ELECTRONICS ENG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006

Coefficients Channels, Capacity of MIMO Systems with Static , Capacity of MIMO Systems with Fading Channels	
Unit 3: Multiple Antennas and Space-Time Communications: Narrowband MIMO Model, Parallel Decomposition of the MIMO Channel MIMO Diversity Gain: Beamforming, Diversity/Multiplexing Tradeoffs, Space-Time Modulation and Coding. ML Detection and Pair Wise Error Probability	7
Unit 4: Space-Time Block Codes: Alamouti Space-Time Code with Multiple Receive Antennas, Space- Time Block Codes (STBC), STBC for Real Signal Constellations, STBC for Complex Signal Constellations, Decoding of STBC, Performance of STBC, Effect of Imperfect Channel Estimation and Antenna Correlation on Performance	7
Unit 5: Layered Space-Time Codes: LST Transmitters, LST Receivers, QR Decomposition, Interference Minimum Mean Square Error (MMSE) Suppression Combined with Interference Cancellation, Iterative LST Receivers, An Iterative Receiver with PIC, An Iterative MMSE Receiver, Comparison of the Iterative MMSE and the Iterative PIC-DSC Receiver, VBLAST architecture, DBLAST Architecture.	7
Unit 6: Space-Time Trellis Codes: Encoder Structure for STTC, Generator Description, Optimal STTC Based on the Rank, Determinant and Trace Criterion, Performance Comparison for Codes Based on Different Design Criteria, The Effect of Imperfect Channel Estimation on Code Performance, Design of Space-Time Trellis Codes on Fast Fading Channels, Construction of Recursive	7

Note:- Minimum twelve tutorials should be performed on entire syllabus

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Text Books:

1. Larsson, Erik G. and Petre Stoica, Space-Time Block Coding for Wireless Communications, Cambridge University Press (2008).

2. Arogyaswami.,Paulraj, Gore, Dhananjay and Nabar, Rohit., Introduction to Space- Time Wireless Communications, Cambridge University Press (2008).

Reference Books:

1. David, Tse and Viswanath, Pramod, Fundamentals of Wireless Communication, Cambridge University Press (2006).

2. Fitzek, Frank H.P., Katz and Marcos D., Cooperation in Wireless Networks: Principles and Applications, Springer(2007).

H.O.D.
DEPARTMENT OF ELECTRONICS EN
D. Y. Patil College of Engg. & Tech
Kasaba Bawada, Kolhapur - 416 00

First Year M.Tech. Curriculum

w.e.f. 2023-2024

Course Title: Designing with PSoC	
Course Code: 232ETCL518	**Semester** : II
Teaching Scheme : L-T-P :3-0-0	**Credit**: 3
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks** : 50

Course Description:

This course aims to provide exposure to the concepts of System on chip(SoC) and the details of programmable System on chip(PSoC) architecture such as PSoC-4. It also gives exposure to various applications of PSoC.

Course Objectives:

1	Understand system on chip (SoC) concept and its capabilities.
2	Understand the SoC architecture and bus interconnects.
3	Analyse the various applications of SoC.
4	Understand the Programmable SoC & its capabilities.
5	Apply the EDA tools useful for the design of PSoC based embedded system.
6	Analyse the various applications of Programmable SoC.

Course Outcomes (COs):

At the end of the course the student will be able to:

518.1	Understand system on chip (SoC) concept and its capabilities.
518.2	Understand the SoC architecture and bus interconnects.
518.3	Analyse the various applications of SoC.
518.4	Understand the Programmable SoC & its capabilities.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

518.5	Apply the EDA tools useful for the design of PSoC based embedded system.
518.6	Analyse the various applications of Programmable SoC.

Prerequisite:	Embedded systems , C Programming

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
518.1	1		2	1	2									1	L2
518.2	1		2	1	2								1	2	L2
518.3		1	2										1	2	L4
518.4	1		2	1	2									1	L2
518.5			2		2									1	L3
518.6	1	1		1											L5

H.O.D.
DEPARTMENT OF ELECTRONICS EN
D. Y. Patil College of Engg. & Tech
Kasaba Bawada, Kolhapur - 416 00

Contents	Hrs
Unit 1: Introduction system on chip (SoC): System Architecture: An Overview, Components of the System: Processors, Memories and Interconnects, Hardware and Software: Programmability Versus Performance, Processor Architectures, Memory and Addressing, System-Level Interconnection, SoC definition, An Approach for SOC Design, System Architecture and Complexity, Product Economics and Implications for SOC.	6
Unit 2 :Processors & interconnect Introduction, Processor Selection for SOC, Basic Concepts in Processor Architecture, processor microarchitecture, Overview: Interconnect Architectures, Bus: Basic Architecture, SOC Standard Buses: AMBA, Core Connect, Bus Interface Units: Bus Sockets and Bus Wrappers, Analytic Bus Models.	9
Unit 3: Application Studies Introduction, SOC Design Approach, Application Study AES: AES Algorithm and Requirements, AES:Design and Evaluation, Application Study Image Compression: JPEG Compression, Example JPEG System for Digital Still Camera	6
Unit 4:Programmable SoC(PSoC) Programmable SoC, ARM Cortex M0 CPU architecture, Introduction to PSoC3, PSoC4 and PSoC5, comparison between PSoC3, PSoC4 and PSoC5, Introduction to PSoC4 MCU CY8C42xx-BL– features, block diagram, CPU & memory subsystem, system resources, MCU clocking architecture, Bluetooth LE and subsystem, programmable analog, programmable digital, fixed function digital, GPIO, Special function peripherals-LCD segment drive, CAPSENSE, PSoC system application connection diagram.	9
Unit 5:EDA tools for PSoC PSoC creator-understanding PSoC creator- concepts, general tasks, frame work, project types, component/instance, Design entry tools-schematic editor, code editor, pin editor. building a PSoC creator project- block diagram showing processes at a high level, UDBs in PSoC creator, programming & debugging PSoC-configuring the PSoC programmer, launching the programmer, debugger, completing the PSoC project- Several steps.	6
Unit 6: Case Study of PSoC based applications PSoC-based noncontact-type level sensing for conductive and nonconductive liquids, PSoC based intelligent water consumption meter, PSOC based isolated speech recognition system for appliances control	6

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

References books:

1. **Computer System Design: System on Chip** , Michael J. Flynn, Wayne Luk, A John Wiley & Sons, Inc., Publication
2. **Multiprocessors systems-on-chips**, Ahmed Jerrya, Wayne Wolf, Morgan Kaufman Publishers
3. The definitive guide to ARM Cortex-M3, Joseph Yiu, Elsevier, 2nd Edition

Online Resources:

1. www.infineon.com
2. Core connect architecture at http://www.chips.ibm.com/products/coreconnect

H.O.D.
DEPARTMENT OF ELECTRONICS EN
D. Y. Patil College of Engg. & Tech
Kasaba Bawada, Kolhapur - 416 00

First Year M. Tech. Curriculum

w.e.f. 2023-2024

Course Title: Patten recognition and Machine Learning Lab	
Course Code: 232ETCP520	**Semester** : II
Teaching Scheme : L-T-P :0-0-2	**Credit**: 1
Evaluation Scheme : ISE Marks : 25	ESE POE: N.A.

Course Description:

This lab course aims to provide the knowledge of core concepts of Machine Learning (ML). ML techniques are applied to real-world problems and develop ML based applications.

Course Objectives:

1	To introduce basic concepts in Python tools for Machine learning
2	To develop some algorithms for ML applications
3	Emphasize practical aspects of various machine learning algorithms.

Course Outcomes (COs):

At the end of the course the student will be able to:

520.1	Extract, transform and clean the data sets using Python
520.2	Use machine learning libraries and apply established machine learning algorithms in Python
520.3	Gain hands-on knowledge on Machine learning concepts in Python using problem solving approach by working on real time cases and in class programming assignments

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

520.4	Evaluation and debugging of various learning algorithms
520.5	Detailed understanding and application of advanced machine learning concepts

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
520.1	1	1	1	1	1								2	2	L2
520.2	2	2	2	2	2								2	2	L3
520.3	2	2	2	2	2								2	2	L3
520.4	2	2	2	2	2								2	2	L3
520.5	2	2	2	2	2								2	2	L3

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

List of Experiments			
Expt. No.	Name of Experiment	Type Hours	Type Hours
1	To clean & pre-process the data using Python	O	2
2	To create a Simple Linear Regression model to find out the best fitting line for given dataset	O	2
3	To build a Machine Learning model using the Logistic regression algorithm	O	2
4	To take decision particular situation use Naïve Bayes' Classifier	O	2
5	To implement the Logistic Regression	O	2
6	To implement Support Vector Machine model for classification	O	2
7	To implement K-Means model for clustering	O	2
8	To implement Decision Tree algorithm	O	2
9	To implement Random Forest algorithm	O	2
10	To implement Hierarchical clustering algorithm	O	2
11	Mini project	O	6

O: Operational type

Note:- Minimum twelve practical based on above should be conducted.

Text Books:

1. Machine Learning, Anuradha Srinivasaraghavan, and Vincy Joseph, Kindle Edition, 2020, WILEY.
2. Introduction to Machine Learning, Ethem Alpaydin, Second Edition, 2010, Prentice Hall of India.
3. Practical Machine Learning Sunila Gollapudi Packt Publishing Ltd

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

Reference Books:

1. Machine Learning by Tom M. Mitchell, International Edition 1997, McGraw Hill Education

Online Resource:

https://www.javatpoint.com/machine-learning

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.

First Year M.Tech Curriculum

w.e.f. 2023-2024

Course Title: Seminar-II	
Course Code: 232ETCP521	**Semester** : I
Teaching Scheme : L-T-P :0-0-2	**Credit**: 1
Evaluation Scheme : ISE: 50	ESE: --

Course Description:

This course aims to give exposure to the students for developing the presentation skills & delivery of the knowledge about latest trends in Electronics & Telecommunication Engg.

- Each student is required to deliver a seminar presentation on synopsis topic identified from the domain and topic during seminar-I.
- Preparation and presentation of a seminar is intended to synopsis on the topic for the dissertation work.
- The student needs to submit the draft of the synopsis based on their dissertation topic.
- Students are expected to deliver a seminar during tenth week of the semester.

H.O.D.
DEPARTMENT OF ELECTRONICS ENGG.
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur - 416 006.