CO M.Tech. Communication Engineering

ET3901–Mathematical Foundations for Communication Engineering

Course Objective	Course Outcome
The student should be able to	**The student will be able to**
1) Understand probability laws. 2) Understand concept of random variable and advanced density functions. 3) Learn various types of distributions and expectation. 4) Understand Random vectors and random processes.	1) Calculate probabilities by applying probability laws. 2) Derive probability distributions of functions of random variables. 3) Identify an appropriate probability distribution for a given discrete or continuous random variable. 4) Determine covariance and spectral density of stationary random processes.

ET3902 –Passive RF Circuits and Systems

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1) Understand various transmission lines and its characteristics. 2) Study various microwave network models and passive components. 3) Learn various switches, phase shifters and MIC filters. 4) Understand various MMIC and MEMS technologies.	1) Analyze various transmission lines and its characteristics. 2) Analyze various microwave network models and passive components. 3) Apply the knowledge of various switches, phase shifters and MIC filters. 4) Explorevarious MMIC and MEMS technologies.

ET3903 –Lab: Passive RF Circuits and Systems

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1) Understand various transmission lines and its characteristics. 2) Study various microwave network models and passive components. 3) Learn various switches, phase shifters and MIC filters. 4) Understand various MMIC and MEMS technologies.	1) Analyze various transmission lines and its characteristics. 2) Analyze various microwave network models and passive components. 3) Apply the knowledge of various switches, phase shifters and MIC filters. 4) Explore various MMIC and MEMS technologies.

ET3904 –Advanced Digital Communication

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1) Learn Baseband representation, reception and probability of error 2) Understand the transmission errors in digital communication systems 3) Understand the concept of spread spectrum modulation, its types and applications. 4) Understand the practical applications of Multichannel and multicarrier communication systems	1) Distinguish various digital modulation techniques. 2) Analyze the probability of errors in digital communication systems. 3) Apply spread spectrum modulation for various applications of communication systems. 4) Distinguish Multichannel and multicarrier communication systems

ET3905 – Lab: Advanced Digital Communication

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1) Learn Baseband representation, reception and probability of error 2) Understand the transmission errors in digital communication systems 3) Understand the concept of spread spectrum modulation, its types and applications.	1) Distinguish various digital modulation techniques. 2) Analyze the probability of errors in digital communication systems. 3) Apply spread spectrum modulation for various applications of communication systems.

4) Understand the practical applications of Multichannel and multicarrier communication systems	4) Distinguish Multichannel and multicarrier communication systems

ET3906 –Adaptive Signal Processing

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1) Introduce the concept and need of wiener filters 2) Learn the fundamentals of adaptive filters and application e.g noise cancellation, interference cancelling etc. 3) Understand basic principles transform domainadaptive filters by using mathematical perspective. 4) Study adaptive signal processing algorithms (e.g., the LMS algorithm). 5) Study Recursive least squares algorithms & FTRLS algorithm.	1) Devise filtering solutions for optimising the cost function using wiener filters. 2) Analyse convergence and stability issues using LMS algorithm and its transform domain. 3) Evaluate the performance Recursive Least-Squares (RLS) techniques to improve convergence behaviour. 4) Devise filtering solutions for optimising using Kalman Filtering , Adaptive beam forming& FTRLS algorithm.

ET3907 – Lab: Adaptive Signal Processing

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1) Introduce the concept and need of wiener filters 2) Learn the fundamentals of adaptive filters and application e.g noise cancellation, interference cancelling etc. 3) Understand basic principles transform domain adaptive filters by using mathematical perspective.	1) Devise filtering solutions for optimising the cost function using wiener filters. 2) Analyse convergence and stability issues using LMS algorithm and its transform domain. 3) Evaluate the performance Recursive Least-Squares (RLS) techniques to improve convergence behaviour.

4) Study adaptive signal processing algorithms (e.g., the LMS algorithm). 5) Study Recursive least squares algorithms & FTRLS algorithm.	4) Devise filtering solutions for optimising using Kalman Filtering , Adaptive beam forming& FTRLS algorithm.

ET3908 – PE I: Error Control Coding

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1. Understand the need for error correction in data communication and storage systems. 2. Understand numerical operations in finite fields by using both the exponential and polynomial representations of finite field elements. 3. Study an ability to compare and contrast the strengths and weaknesses of various errors correcting code for a given application. 4. Study different error correcting codes in digital communication system.	1. Apply the knowledge of error correction in data communication and storage systems. 2. Analyze numerical operations in finite fields by using both the exponential and polynomial representations of finite field elements. 3. Analyze an ability to compare and contrast the strengths and weaknesses of various errors correcting code for a given application. 4. Demonstrate competence in analyzing and evaluating the practice of different error correcting coded in digital communication system.

ET3909 – PE I: Embedded Systems & DSP Processor

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1. Understand basics of embedded systems 2. Understand ARM processor architecture and instruction set 3. Understand basics of DSP processor 4. Understand architectural features and instruction set of C3X DSP processor	1. Explore different technologies related to embedded systems 2. Effectively utilise the knowledge gained about ARM processor architecture and its instruction set for programming. 3. Explore basics of DSP processor architecture 4. Effectively utilise the knowledge gained about c3x DSP processor and its instruction set for programming

ET3910 – PE I: Pattern Recognition

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1) Equip students with basic mathematical and statistical techniques commonly used in pattern recognition. 2) Understand clustering and probability theory to handle uncertainty and solve engineering problems 3) Introduce to the various pattern recognition algorithms for a given problem.	1) Identify and describe pattern recognition techniques and their roles in building intelligent machines 2) Recognize the feasibility of applying pattern recognition methodology for a particular problem in pattern classification and regression 3) Apply clustering and probability theory to handle uncertainty and solve engineering problems 4) Evaluate and compare solutions by various pattern recognition approaches for a given problem.

ET3911 – PE II: Multimedia Communications

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1) Understand basic concept of digital image representation 2) Learn basics of video and digital audio signal 3) Understand the concepts of image compression 4) Understand the concepts of video compression 5) Understand the concepts of audio compression	1) Describe features of various image file formats and image data type 2) Explain characteristics of video signals like NTSC,PAL,SECAM Implement and describe various image compressiontechniques 3) Explain various video compression techniques 4) Explain various audio compression techniques

ET3912 – PE II: Active RF Devices and Circuits

Course Objective	Course Outcomes
Students should be able to	Students will be able to
1) Understand active devices, and their modeling.	1) Explain different types RF Diodes, Linear &Non linear Diode Models. 2) Design Two Port power gain, Amplifier Stability and for Specified Gain

2) Perform Amplifier Stability ,Stability Circle and Single stage amplifier design for specified gain. 3) An understanding amplifier design unilateral and bilateral cases and for maximum gain. 4) Learn detector and power amplifiers. 5) Understand theory and characteristics of mixer, oscillator, PLL.	3) Devise Characteristics and equivalent circuit of detector and power amplifier. 4) Perform measurements on mixer, Oscillator and PLL

ET3913 – PE II: Soft Computing

Course Objective	Course Outcomes
Students should be able	Students will be able to
1) To have general understanding of soft computing methodologies including artificial neural networks, genetic algorithms, fuzzy sets and fuzzy logic systems. 2) To elaborates the basic concept of Genetic algorithm, genetic inheritance operator, the performance of algorithm and applications. 3) To introduce the fundamentals and explore the architecture of supervised and unsupervised neural networks. 4) To discuss the basic concept of fuzzy set theory and understand the hybrid architectures, fuzzy logic and fuzzy interface	1) Identify and describe soft computing techniques and their roles in building intelligent machines 2) Recognize the feasibility of applying a soft computing methodology for a particular problem andApply genetic algorithms to optimization problems. 3) Identify supervised/unsupervised neural networks algorithms to solve pattern classification problems 4) Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems

II Semester

ET3915 –Advanced Antenna Theory

Course Objective	Course Outcome
The student should be able to	**The student will be able to**
1) Learn the basic principles and of antenna parameters. 2) Design and analyze antennas & Arrays. 3) Design and Analyze Planer antenna 4) Design &Analyze aperture, Reflector Antennas 5) Study different Smart antenna techniques	1) Evaluate various parameters of antennas. 2) Analyze performance parameters of various antennas & antenna array. 3) Understand smart antenna measurement techniques. 4) Design and analyze various antenna

ET3916 –Lab: Advanced Antenna Theory

Course Objective	Course Outcome
The student should be able to	**The student will be able to**
1) Learn the basic principles and of antenna parameters. 2) Design and analyze antennas & Arrays. 3) Design and Analyze Planer antenna 4) Design &Analyze aperture, Reflector Antennas 5) Study different Smart antenna techniques	1) Evaluate various parameters of antennas. 2) Analyze performance parameters of various antennas & antenna array. 3) Understand smart antenna measurement techniques. 4) Design and analyze various antenna

ET3917 –VLSI Signal Processing

Course Objective	Course Outcome
The student should be able	**The student will be able to**
1) To understand basic concepts of implementing DSP algorithms in VLSI circuits 2) To learn about the concept of pipelining and parallel processing in VLSI. 3) To understand the analysis of VLSI system with high speed and low power.	1) Design parallel and pipelining processing systems for speed, power and area optimization. 2) Implement the pipelined and parallel architectures using folding and unfolding techniques. 3) Analyse Systolic Design for Space Representations containing Delays

4) To equip the students with knowledge of Systolic Design for Space Representations containing Delays 5) To learn the algorithms for numeric and algorithmic strength reduction.	4) Apply algorithmic strength reduction techniques such as Fast Convolution algorithms and FDCT algorithms for increasing the speed of computation. 5) Design DSP algorithms with reduced numerical strength by subexpression sharing techniques.

ET3918- Digital Image Processing

Course Objective	Course Outcome
The student should be able	**The student will be able to**
1) Learn the fundamentals of digital image processing algorithms and filtering methods. 2) Study the performance of digital images in frequency domain. 3) Learn restoration, compression and segmentation of digital images through various algorithms 4) Understand the process of image representation and description	1) Apply basic image processing algorithms for image enhancement. 2) Interpret the digital images in frequency domain by using various transform techniques. 3) Understand noise models and degradation process for image restoration 4) Implement the algorithms for image compression and segmentation. Implement the algorithms for image representation and description

ET3918–Lab : Digital Image Processing

Course Objective	Course Outcome
The student should be able	**The student will be able to**
1) Learn the fundamentals of digital image processing algorithms and filtering methods. 2) Study the performance of digital images in frequency domain. 3) Learn restoration, compression and segmentation of digital images through various algorithms 4) Understand the process of image representation and description	1) Apply basic image processing algorithms for image enhancement. 2) Interpret the digital images in frequency domain by using various transform techniques. 3) Understand noise models and degradation process for image restoration 4) Implement the algorithms for image compression and segmentation. Implement the algorithms for image representation and description

ET3920 –Wireless Communications & Networks

Course Objective	Course Outcome
The student should be able to	**The student will be able to**
1) Understand the concept of radio propagation , fading and different techniques to improve signalquality and link performance.	1) Quantify causes and effects of path loss and signal fading on received signal characteristic and used various technique to improve signal quality and link performance.
2) Understand various Multicarrier Modulation and Multiple access techniques for wireless communication	2) Analyze various Multicarrier Modulation and Multiple access techniques for wireless communication
3) Learn Wireless Systems and Standards	3) Analyze GSM & CDMA systems andunderstand the fundamentals of wireless networking.
4) Know various generations of mobile communication systems	4) Elaborate and compare various generations of mobile communication systems

ET3921 –PE III: Selected Topics in Communication Systems

Course Objective	Course Outcome
The student should be able to	**The student will be able to**
1) Make the students understand the fundamentals physical modeling of channels in free space along with time varying systems.	1) Understand and design physical modeling of channels in free space along with time varying systems.
2) Understand the working of time diversity detection in a Rayleigh fading channel and to analyze orthogonal frequency division multiplexing.	2) Compare and analyze Non-coherent and Coherent detection Time diversity.
3) Understand the modeling of MIMO,SIMO,MISO along with time varying channels and selective fading.	3) Elaborate key features of various standards related to modeling of MIMO,SIMO,MISO
	4) Understand and analyze V-BLAST and D-BLAST architecture
4) Understand and compare parallel and scalar channels.	5) Design and understand multiplexing tradeoff - Universal code design for scalar channels, parallel channels

ET3922 –PE III: Speech Processing

Course Objective	Course Outcome
The student should be able to	**The student will be able to**
1) Learn speech production mechanism. 2) Understand time and frequency domain method for speech processing. 3) Learn linear predictive coding analysis of speech. 4) Understand various speech and speaker recognition methods.	1) Identify digital speech productionmodel. 2) Process speech using time and frequency domain method. 3) Analyze speech by linear predictive coding method. 4) Recognize speech and speaker.

ET3924 –PE III: Real Time Operating System

Course Objective	Course Outcome
The student should be able to	**The student will be able to**
1) Understand real time systems with reference model 2) Know functional parameters, resources and scheduling. 3) Study Faults and error containment. 4) Learn Memory management and I/O system process management.	1) Analyzethevarious real time systems with reference model 2) Discuss the various functional parameters , resources and scheduling. 3) Detect multiple Faults and reduce error containment. 4) Explore the various Memory management and Input/Output system process management

ET3925 –PE IV: High Speed Networks

Course Objective	Course Outcome
The student should be able to	**The student will be able to**
1) Understand different networks and network topologies	1) analyze different networks and network topologies

2) Know protocols used in high speed networks 3) Study Network design issues 4) Study optical sensors and Networks	2) Compare different protocols used in high speed networks 3) Solve Network design issues 4) Compare optical sensors and Networks

ET3926 –PE IV: Wireless Sensor Networks

Course Objective	Course Outcome
The student should be able to	**The student will be able to**
1) To Understand the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology 2) Understand the medium access control protocols and address physical layer issues 3) Learn key routing protocols for sensor networks and main design issues 4) Learn transport layer protocols for sensor networks, and design requirements 5) Understand the Sensor management, sensor network middleware, operating systems.	1) Understand and explain common wireless sensor node architectures. 2) Carry out simple analysis and planning of WSNs. 3) Demonstrate knowledge of MAC protocols developed for WSN. 4) Demonstrate knowledge of routing protocols developed for WSN. 5) Understand and explain mobile data-centric networking principles. 6) Be familiar with WSN standards.

ET3928 –Seminar

Course Objective	Course Outcome
The student should be able to	**The student will be able to**
	1) Write effectively in English.
1) Gain profound knowledge about English language. .	2) Analyze logically and critically on different issues.
2) Learn logical and critical reasoning skills	3) Solve quantitative problems effectively.
3) Know mathematical formulae for quantitative reasoning	4) Apply fundamentals of Electronics and Telecommunication for practical applications.
4) Acquire sound technical knowledge	

III Semester

ET3939 - Project Phase-I

COURSE OBJECTIVE	COURSE OUTCOMES
1. To provide the students the academic environment to carry out literature survey of advanced topics in structural engineering 2. To motivate the students to use the modern tools and software. 3. To provide the students the understanding of various aspects like effective communication skills, working independently and in a team and the importance of lifelong learning etc. to carry out project.	1. An ability to understand the advances in structural engineering. 2. An ability to understand the use of modern tools. 3. An ability to work independently and in a team for effective communication 4. An ability to understand the importance of lifelong learning.

IV Semester

ET3940 - Project Phase-II

COURSE OBJECTIVE	COURSE OUTCOMES
1. To provide the students the academic environment to carry out literature survey of advanced topics in structural engineering. 2. To provide the students the understanding of real world structural engineering problems and their solution. 3. To motivate the students to use the modern tools and software. 4. To provide the students the understanding of various aspects like effective communication skills, working independently and in a team and the importance of lifelong learning etc. to carry out project.	1. An ability to understand the advances in structural engineering. 2. An ability to solve real world structural engineering problems. 3. An ability to understand the importance of lifelong learning and the use of modern tools. 4. An ability to work independently and in a team for effective communication.