



Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Department of Electronics & Telecommunication Engineering
Academic Year 2022-23
Revise 2019-20
Program Outcomes
PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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Program Specific Outcomes	
At the end of the program engineering graduate will be able to:	
PSO1. Apply the knowledge of Electronics and Communication to analyse, design and implement application-specific problems with modern tools.	
PSO2: Adapt emerging technologies with continuous learning in the field of Electronics and Telecommunication engineering with appropriate solutions to real life problems.	
Course Outcomes	
At the end of the semester, the student will able to	
FEC101	Engineering Mathematics-I
FEC101.1	Apply the concepts of Complex Numbers to solve Engineering problems.
FEC101.2	Apply hyperbolic functions and logarithm of complex number to solve Engineering problems.
FEC101.3	Compute the partial differentiation of functions of two & three variables.
FEC101.4	Find the nth order derivative of a function using successive differentiation & Compute maxima-minima of a function.
FEC101.5	Apply the properties of matrices to find rank of a matrix & to solve system of linear simultaneous equations.
FEC101.6	Solve the system of linear algebraic and transcendental equation numerically and also by using Scilab.
FEC102	Engineering Physics-I
FEC102.1	Analyse the motion of free particle using time independent & time dependent Schrodinger wave equation
FEC102.2	Draw miller indices using concept of crystallography and Identify crystal structure using X-ray diffraction technique
FEC102.3	Explore the concepts of semiconductor physics and apply them for applications like LED, photoconductor and photovoltaic cell.
FEC102.4	Employ the concept of interference in thin films in measurements.
FEC102.5	Examine the properties of superconductors and super capacitors and apply them for the applications in-hand
FEC102.6	Explore the properties of engineering materials and their applications



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FEC103	Engineering Chemistry-I
FEC103.1	Analyse the quality of water and suggest methods of its treatment.
FEC103.2	Differentiate thermosoftening & thermosetting plastic & select appropriate fabrication method.
FEC103.3	Understand the concept of microscopic chemistry in terms of atomic and molecular orbital theory & calculate bond order of molecule.
FEC103.4	Understand the concept of aromaticity & calculate aromaticity using Huckel's Rule.
FEC103.5	Understand Gibb's phase rule & calculate number of phases, component & degree of freedom of one & two component system.
FEC103.6	Differentiate ionic, dipolar & Vander waal's intermolecular forces of attraction.
FEC104	Engineering Mechanics
FEC104.1	Illustrate the concept of force, moment and apply the same along with the concept of equilibrium in two and three-dimensional systems with the help of FBD.
FEC104.2	Demonstrate the understanding of Centroid and its significance and locate the same
FEC104.3	Estimate required force to overcome friction and correlate real life application to specific type of friction.
FEC104.4	Establish relation between velocity and acceleration of a particle and analyse the motion by plotting the relation
FEC104.5	Illustrate different types of motions and establish Kinematic relations for a rigid body
FEC104.6	Analyse body in motion using force and acceleration, work-energy, impulse- momentum principles
FEC105	Basic Electrical Engineering
FEC105.1	Analyse DC circuits and apply Superposition, Thevenin's, Nortons', Maximum Power Transfer theorems to determine their response
FEC105.2	Analyse single-phase AC circuit and determine their response
FEC105.3	Analyse three-phase circuits and determine voltage/current/power relationship in star and delta connections.
FEC105.4	Understand the construction and operation of single-phase transformer and evaluate its equivalent circuit and efficiency.
FEC105.5	Compare single phase & three phase machines on the basis of working principle, constructional details and operation
FEL101	Engineering Physics-I Lab
FEL101.1	Perform the experiments based on interference in thin films and analyse the results.



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FEL101.2	Determine the crystal structure and study/draw miller indices
FEL101.3	Determine energy band gap of semiconductor.
FEL101.4	Study Hall Effect in semiconductor devices
FEL101.5	Design a solution for a real-world problem using knowledge gained in this course
FEL102	Engineering Chemistry-I Lab
FEL102.1	Analyse water for its hardness.
FEL102.2	Estimate viscosity of lubricant using Redwood viscometer.
FEL102.3	Estimate chloride content of water using Mohr's method.
FEL102.4	Identify nature of solution based on its pH value.
FEL102.5	Demonstrate phenol-formaldehyde synthesis.
FEL103	Engineering Mechanics Lab
FEL103.1	Verify the law of polygon, varignon's theorem and find the resultant of given force system
FEL103.2	Verify the conditions of equilibrium and find the beam reactions
FEL103.3	Analyse the friction between two different surfaces.
FEL103.4	Demonstrate the understanding of Centroid and its significance and locate the same
FEL103.5	Illustrate different types of motions and establish Kinematic relations for particles and rigid body.
FEL103.6	Verify the law of conservation of momentum and find the coefficient of restitution.
FEL104	Basic Electrical Engineering Lab
FEL104.1	Implement DC circuits and analyse their behavior using network theorems
FEL104.2	Analyse frequency behavior of RLC circuit and calculate resonance frequency, Bandwidth and Q- factor.
FEL104.3	Determine relationship between voltage/current/power in three phase star/delta circuits.
FEL104.4	Perform OC/SC test on transformer and determine its equivalent circuit and efficiency.
FEL104.5	Illustrate the working of Single & Three Phase Induction Motor
FEL105	Basic Workshop practice-I
FEL105.1	Use different fitting tools and perform the basic operations such as square, hexagonal and V male-female joint.
FEL105.2	Develop the skill required for hardware maintenance, and installation of operating system and system drivers.



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FEL105.3	Identify the network components and perform basic networking and crimping.
FEL105.4	Develop the skill to use different plumbing tools and accessories for domestic water line.
FEC201	Engineering Mathematics-II
FEC201.1	Solve differential equations of first order & first degree.
FEC201.2	Solve linear differential equations with constant coefficients, variable coefficients of higher order.
FEC201.3	Apply Beta, Gamma functions and D.U.I.S.to solve improper integrals.
FEC201.4	Apply concepts of Double integral of different coordinate systems to compute Area.
FEC201.5	Apply concepts of triple integral of different coordinate systems to find volume of a solids.
FEC201.6	Solve Differential equations & Definite integrals using Numerically and also by using Scilab.
FEC202	Engineering Physics-II
FEC202.1	Examine the diffraction through single slit and its applications.
FEC202.2	Apply the foundation of laser and fiber optics in development of modern communication technology.
FEC202.3	Explore the fundamentals of Electrodynamics and its application in the field of engineering.
FEC202.4	Explore the fundamentals of special theory of relativity
FEC202.5	Assimilate the scope of nanotechnology in modern developments and its role in emerging innovating applications.
FEC202.6	Select appropriate sensing technology for physical measurements in modern instrumentations.
FEC203	Engineering Chemistry-II
FEC203.1	Identify types of corrosion & select corrosion control measures.
FEC203.2	Analyse the quality of fuel & calculate the oxygen required for combustion of fuel.
FEC203.3	Discuss the range of EMS used for molecular transitions in spectroscopic techniques and determine possibility of molecular transitions.
FEC203.4	Discuss the phenomenon of fluorescence & Phosphorescence.
FEC203.5	Understand the concept of electrode potential & calculate EMF of cell.
FEC203.6	Illustrate the principles of green chemistry & examine its environmental impact.



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FEC204	Engineering Graphics
FEC204.1	Apply the basic principles of projections in Projection of Lines and Planes
FEC204.2	Apply the basic principles of projections in Projection of Solids & Section of solids
FEC204.3	Apply the basic principles of projections in converting 3D view to 2D drawing.
FEC204.4	Visualize an object from the given two views.
FEC205	C programming
FEC205.1	Write an algorithm to support Structure Programming approach.
FEC205.2	Use variables, derived data types and control structures to write c program
FEC205.3	Decompose a problem into functions and synthesize a complete program
FEC205.4	Use Array and String for solving complex computational problem
FEC205.5	Use Structure-Union for solving complex computational problem
FEC205.6	Use Pointers for solving complex computational problem
FEC206	Professional Communication and Ethics-I
FEC206.1	Communicate effectively using verbal/non-verbal cues at social and workplace situation.
FEC206.2	Select/Use appropriate grammar and vocabulary in oral, written communication
FEC206.3	Summarize/Comprehend passages, run plagiarism check softwares and generate plagiarism report for paraphrased passages
FEC206.4	Write/ Draft academic, business and technical letter/email
FEC206.5	Frame Definition, write user instruction, description of technical object, description of a Technical / Scientific Process
FEC206.6	Demonstrate principles of ethics in professional environment
FEL201	Engineering Physics -II Lab
FEL201.1	Perform the experiments based on diffraction through slits using Laser source and analyse the results.
FEL201.2	Determine the number of lines on the grating surface using LASER Source.
FEL201.3	Perform the experiments using optical fibre and analyse its characteristics
FEL201.4	Perform the experiments on various sensors and analyse the result.
FEL201.5	Implement a solution for a real-world problem using knowledge gained in this course
FEL202	Engineering Chemistry-II Lab



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FEL202.1	Analyse fuel for moisture content.
FEL202.2	Estimate Na, k & Ca in the given sample using flame photometer.
FEL202.3	Estimate flash point of diesel oil using Abel's apparatus.
FEL202.4	Determine saponification value of vegetable oil.
FEL202.5	Estimate acid value of vegetable oil.
FEL203	Engineering Graphics Lab
FEL203.1	Apply the basic principles of projections in Projection of Lines and Planes and Curves
FEL203.2	Apply the basic principles of projections in Projection of Solids & Section of solids
FEL203.3	Apply basic AutoCAD skills to draw different views of a 3D object
FEL203.4	Apply basic AutoCAD skills to draw the isometric view from the given two views
FEL204	C programming Lab
FEL204.1	Translate given algorithms to a program
FEL204.2	Use variables, derived data types and control structures to write c program
FEL204.3	Write iterative as well as recursive programs
FEL204.4	Represent data in Array and String and manipulate them through a program
FEL204.5	Use Structure-Union for solving complex computational problem
FEL204.6	Declare pointers and demonstrate call by reference concept
FEL205	Professional Communication and Ethics-I Lab
FEL205.1	Listen and comprehend all types of spoken discourse successfully
FEL205.2	Speak fluently and make effective professional presentations.
FEL205.3	Read large quantities of text in a short time to comprehend, summarise and evaluate content
FEL205.4	Draft precise business letters, academic essays and technical guidelines.
FEL205.5	Dress finely and conduct themselves with confidence in social, academic and professional situation.
FEL205.6	Respond to moral dilemmas successfully.
FEL206	Basic Workshop practice-II
FEL206.1	Use different carpentry tools and perform the basic operations like joints and wood turning practise.
FEL206.2	Understand the safe practices to adopt in electrical workshop.



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FEL206.3	Demonstrate the wiring practices for the connection of simple electrical load.
FEL206.4	Demonstrate the use of furnace and produce the simple forging job.
ECC301	Engineering Mathematics III
ECC301.1	Understand and apply the concept of Laplace transform to solve the real integrals in engineering problems.
ECC301.2	Apply the concept of inverse Laplace transform of various functions and its applications in engineering problems.
ECC301.3	Expand the periodic function by using Fourier series for real life problems and complex engineering problems.
ECC301.4	Understand complex variable theory, application of harmonic conjugate to get orthogonal trajectories and analytic function.
ECC301.5	Apply the concept of matrix algebra to solve the engineering problems.
ECC301.6	Apply the concepts of vector calculus in real life problems.
ECC302	Electronic Devices & Circuits
ECC302.1	Understand the working principles of semiconductor devices and its characteristics.
ECC302.2	Illustrate biasing techniques of BJT, JFET and MOSFET.
ECC302.3	Analyse small signal performance parameters for BJT (CE) amplifier and EMOSFET (CS) amplifier
ECC302.4	Illustrate frequency response of BJT and MOSFET amplifier.
ECC302.5	Compare the power amplifier based on efficiency and power consumption.
ECC302.6	Explain the working principal of differential amplifier.
ECC303	Digital System Design
ECC303.1	Understand Number systems and logical operations.
ECC303.2	Explain working of logic gates and logic families.
ECC303.3	Apply the concepts of logic operations to design and implement combinational circuits.
ECC303.4	Apply the concepts of logic operations to design and implement sequential circuits.
ECC303.5	Classify types of memories and Programmable Logic Devices (PLDs).
ECC303.6	Apply concepts of VHDL / Verilog to describe digital circuits.



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ECC304	Network Theory
ECC304.1	Apply the knowledge of KVL and KCL in analyzing Circuits by using network theorems.
ECC304.2	Apply the time and frequency method of analysis.
ECC304.3	Evaluate circuit using graph theory.
ECC304.4	Find the various parameters of two port network.
ECC304.5	Explains network functions for one port and two port and analyse their behaviour in terms of poles and zeros.
ECC304.6	Synthesize the network using passive elements.
ECC305	Electronic Instrumentation & Control Systems
ECC305.1	Explain the working principle of testing and measuring instruments.
ECC305.2	Explain working principle of sensors and transducers with their applications
ECC305.3	Apply various techniques to compute Transfer Function of a system
ECC305.4	Analyze transient and steady-state response of first and second-order control systems for different standard test signals
ECC305.5	Analyze the stability of a system in the time domain
ECC305.6	Analyze stability of a system in the frequency domain
ECL301	Electronic Devices & Circuits Lab
ECL301.1	Explain working principal of electronics devices.
ECL301.2	Observe the characteristics of semiconductor devices.
ECL301.3	Demonstrate the performance of BJT and MOSFET amplifiers.
ECL301.4	Demonstrate the frequency response of an amplifier.
ECL301.5	Demonstrate the performance of power amplifier.
ECL301.6	Demonstrate performance of differential amplifier.
ECL302	Digital System Design Lab
ECL302.1	Implement basic gates using universal gates.
ECL302.2	Demonstrate Boolean functions using logic gates.
ECL302.3	Design and Implement Combinational circuits.
ECL302.4	Demonstrate working of flip flops and their interconversions.
ECL302.5	Design and Implement Sequential circuits.
ECL302.6	Simulate digital circuits using VHDL / Verilog.
ECL303	Electronic Instrumentation & Control Systems Lab
ECL303.1	Demonstrate the performance characteristics of transducers



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ECL303.2	Demonstrate the working principle of the bridge circuit
ECL303.3	Demonstrate the response of the Type 0, 1, and 2 systems
ECL303.4	Analyze the transient and steady-state response of a given system
ECL303.5	Analyze the stability of a given system in the time domain.
ECL303.6	Analyze the stability of a given system in the frequency domain
ECL304	Skill Lab: C++ and Java Programming
ECL304.1	Describe the basic principle of C++.
ECL304.2	Apply the concepts of control structures for effective programming in C++.
ECL304.3	Develop programming applications using object-oriented language in C++.
ECL304.4	Describe the basic principle of JAVA.
ECL304.5	Implement different programming applications using JAVA Packaging.
ECL304.6	USE exceptional handling to develop programs in JAVA.
ECM301	Mini Project 1A
ECM301.1	Identify problems based on societal, research, and industry needs.
ECM301.2	Investigate the problem thoroughly and propose an appropriate solution to solve the problem.
ECM301.3	Build PCB layout and fabricate the same.
ECM301.4	Implement and troubleshoot the circuit.
ECM301.5	Develop interpersonal skills to work as a member of a group or leader.
ECM301.6	Write and present their work effectively with ethical values.
ECC401	Engineering Mathematics IV
ECC401.1	Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals.
ECC401.2	Apply the concept of Correlation and Regression to engineering problems in data science, machine learning, and AI.
ECC401.3	Apply the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.
ECC401.4	Apply the concept of vector spaces and orthogonalization process in Engineering Problems.
ECC401.5	Use the concept of Quadratic forms and Singular value decomposition which are very useful tools in various Engineering applications.
ECC401.6	Find the extremals of the functional using the concept of Calculus of variation.



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ECC402	Microcontrollers
ECC402.1	Understand the elements of the microprocessor-based system.
ECC402.2	Understand the memory of microprocessor-based system
ECC402.3	Illustrate the detailed architecture of the 8051 microcontrollers.
ECC402.4	Write assembly language program for 8051 microcontroller.
ECC402.5	Illustrate the detailed architecture of advance microcontroller ARM7.
ECC402.6	Illustrate microcontroller-based applications.
ECC403	Linear Integrated Circuits
ECC403.1	Understand the working of OPAMP and its applications.
ECC403.2	Apply the fundamentals of OPAMP in linear IC application.
ECC403.3	Apply the fundamentals of OPAMP in Nonlinear IC application.
ECC403.4	Understand the working of IC 555 and its applications.
ECC403.5	Apply the fundamentals of regulator to design it with given specification.
ECC403.6	Explain the working of special purpose linear IC's.
ECC404	Signals & Systems
ECC404.1	Classify and Analyse different types of signals and systems.
ECC404.2	Analyse continuous time LTI signals and systems in transform domain
ECC404.3	Analyse discrete time LTI signals and systems in transform domain
ECC404.4	Represent signals using Fourier Series and Analyse the systems using the Fourier Transform.
ECC404.5	Classify and realize basic structures of DT systems
ECC404.6	Demonstrate the concepts learnt in Signals and systems Course using modern engineering tools.
ECC405	Principles of Communication Engineering
ECC405.1	Explain the basic components and types of noise in the communication system
ECC405.2	Analyse the concepts of Amplitude Modulation and Demodulation techniques
ECC405.3	Analyse the concepts of Angle Modulation and Demodulation techniques.
ECC405.4	Compare the performance of AM and FM receivers.
ECC405.5	Describe analog and digital pulse modulation and demodulation techniques.



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ECC405.6	Explain the principles of multiplexing and demultiplexing techniques.
ECL401	Microcontrollers Lab
ECL401.1	Understand different development tools required to develop microcontroller-based systems
ECL401.2	Write a program for arithmetic and logical operations.
ECL401.3	Write a program using code conversion and data transfer operation.
ECL401.4	Write an assembly language program for arrays.
ECL401.5	Write assembly language programs for general-purpose I/O, Timers, and interrupts.
ECL401.6	Write a program to interface input-output device with 8051 microcontroller.
ECL402	Linear Integrated Circuits Lab
ECL402.1	Understand the workings of OPAMP and its application.
ECL402.2	Demonstrate the performance of linear applications using OPAMP.
ECL402.3	Demonstrate the performance of nonlinear applications using OPAMP.
ECL402.4	Implement Astable and Monostable multivibrators using IC 555 with given specifications.
ECL402.5	Demonstrate the Regulation characteristics of the voltage regulator.
ECL402.6	Simulate any application of linear ICs using Simulation Software.
ECL403	Principles of Communication Engineering Lab
ECL403.1	Demonstrate AM transmission systems in time and frequency domain using hardware and software (MATLAB)
ECL403.2	Demonstrate FM transmission systems in time and frequency domain using hardware and software (MATLAB)
ECL403.3	Demonstrate AM and FM radio receivers and observe waveforms in time and frequency domain
ECL403.4	Implement PWM modulation and demodulation circuit using 555 IC and observe waveforms.
ECL403.5	Verify the Sampling theorem in (MATLAB) and observe the effect by changing the sampling frequency
ECL403.6	Demonstrate the working principle of Time Division Multiplexing/ Demultiplexing.
ECL404	Skill Lab: Python Programming



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ECL404.1	Understand the syntax and semantics in Python
ECL404.2	Illustrate functions and file-handling operations.
ECL404.3	Demonstrate the concept of object-oriented programming in Python
ECL404.4	Demonstrate the concept of GUI and image processing in Python
ECL404.5	Use Python libraries for various applications
ECL404.6	Implement machine learning applications using Python
ECM401	Mini Project 1B
ECM401.1	Identify problems based on societal, research, and industry needs.
ECM401.2	Investigate the problem thoroughly and propose appropriate solutions to solve the problem.
ECM401.3	Apply the knowledge of interfacing devices to Arduino/Raspberry pi.
ECM401.4	Implement and troubleshoot the proposed method using Arduino/Raspberry pi.
ECM401.5	Develop interpersonal skills to work as a member of a group or leader.
ECM401.6	Write and present their work effectively with ethical values.
ECC501	Digital Communication
ECC501 .1	Apply the concepts of information theory in source coding.
ECC501 .2	Compare different error control systems and apply various error detection codes.
ECC501 .3	Analyze different error correction codes
ECC501 .4	Compare various baseband transmission methods for digital signals
ECC501 .5	Evaluate the performance of optimum baseband detection in the presence of white noise
ECC501 .6	Compare the performances of different digital modulation techniques.
ECC502	Discrete-Time Signal Processing
ECC502 .1	Analyse discrete-time systems using DFT and FFT.
ECC502 .2	Design digital IIR filters for given specifications.
ECC502 .3	Design digital FIR filters for given specifications.
ECC502 .4	Analyse different realization structures of Digital IIR and FIR filters.
ECC502 .5	Analyze the impact of finite word length on the performance of digital filters.
ECC502 .6	Apply signal processing concepts and algorithms in biomedical and audio signal processing applications.



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ECC503	Digital VLSI
ECC503.1	Illustrate MOS operation and fabrication process.
ECC503.2	Illustrate the performance parameters of the CMOS inverter.
ECC503.3	Realize combinational and sequential circuits using different design styles and compare their performance parameter.
ECC503.4	Explain the operation of semiconductor memories.
ECC503.5	Illustrate data path elements and system-level design issues.
ECC503.6	Illustrate the RTL Design Process with its Case Studies.
ECC504	Random Signal Analysis
ECC504.1	Apply theory of probability and solve relevant problems
ECC504.2	Differentiate continuous and discrete random variables and their distributions.
ECC504.3	Apply the concepts of expectations and functions of one-dimensional random variables to solve relevant problems.
ECC504.4	Apply the concepts of expectations and functions of multi-dimensional Random variables to solve relevant problems.
ECC504.5	Apply fundamentals of Random process in identifying it's type.
ECC504.6	Explain linear regression algorithms for predictive applications.
ECCDLO5013	IT Infra and Security
ECCDLO5013.1	Explain the fundamentals of IT Infrastructure and its Management.
ECCDLO5013.2	Understand the concept of Access Control Policies and Models, Authentication, and Access Control Services.
ECCDLO5013.3	Illustrate software vulnerabilities and attacks.
ECCDLO5013.4	Analyze the protection mechanisms for operating systems and database security.
ECCDLO5013.5	Explore the security aspects of wireless network infrastructure and protocols.
ECCDLO5013.6	Investigate the different attacks on Web Applications and Web services.
ECCDLO5014	Data Structures and Algorithm
ECCDLO5014.1	Understand the fundamentals of data structures and asymptotic analysis of functions.
ECCDLO5014.2	Apply various operations on stack and queue data structures and their applications.
ECCDLO5014.3	Apply addition and deletion operations on the Linked list data structures.



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ECCDLO5014.4	Apply insertion, deletion, and searching operations on trees and graphs.
ECCDLO5014.5	Select a suitable searching & sorting technique for a database application.
ECCDLO5014.6	Select a suitable hash function and collision resolution technique for a database application.
ECCDLO5015	Sensor Technology
ECCDLO5015.1	Understand the transduction principle of various sensors.
ECCDLO5015.2	Select sensors suitable for the required application
ECCDLO5015.3	Illustrate working of various MEMS sensors and actuators for a particular application
ECCDLO5015.4	Analyze wireless sensing techniques for various application
ECCDLO5015.5	Explain data acquisition and signal conditioning methods.
ECCDLO5015.6	Create an application using various sensor technologies.
ECL501	Digital Communication Lab
ECL501.1	Compare various source coding schemes
ECL501.2	Design and simulate different error correction codes
ECL501.3	Design and simulate cyclic encoder and decoder
ECL501.4	Students will be able to Compare various line coding techniques
ECL501.5	Implement and analyze various digital modulation techniques
ECL501.6	Students will be able to Compare various source coding schemes
ECL502	Discrete-Time Signal Processing Lab
ECL502.1	Apply different operations on discrete signals using MATLAB
ECL502.2	Determine the output response of the digital filter using different convolution methods in MATLAB.
ECL502.3	Design Butterworth IIR digital filters for given specifications using MATLAB.
ECL502.4	Analyze the response of FIR filters using MATLAB.
ECL502.5	Analyze the realization methods of IIR filters using the MATLAB Simulink tool.
ECL502.6	Analyze frequency response and pole-zero plots of frequency selective filters using MATLAB
ECL503	Digital VLSI Lab
ECL503.1	Observe the Characteristics of MOSFET for various performance parameters.
ECL503.2	Observe the transfer characteristics of the CMOS inverter.
ECL503.3	Implement combinational circuits using LT spice.



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ECL503.4	Sketch the layout for combinational circuits using different design styles.
ECL503.5	Implement sequential circuits using LT spice.
ECL503.6	Sketch the Datapath component.
ECL504	Business Communication and Ethics Lab/Professional Communication & Ethics - II
ECL504.1	Write technical papers and solicited and unsolicited proposals effectively.
ECL504.2	Write a cover letter and prepare a resume, and statement of purpose, participate in GD, and apply for personal interviews.
ECL504.3	Understand the roles and responsibilities of the members of the meeting, prepare meeting documentation, and participate as a member in a meeting.
ECL504.4	Deliver technical business presentations individually and contribute as a team member to building content and visuals in GD
ECL504.5	Demonstrate skills like leadership, motivation, negotiation, etc during their projects.
ECL504.6	Understand Intellectual property rights and demonstrate ethical conduct while analyzing technical papers.
ECM501	Mini Project 2A Embedded System Project
ECM501.1	Understand embedded systems and various Microcontrollers.
ECM501.2	Identify problems based on societal, research, and industry needs.
ECM501.3	Investigate the problem thoroughly and propose an appropriate solution to solve the problem.
ECM501.4	Implement and troubleshoot the proposed method using a Microcontroller
ECM501.5	Develop interpersonal skills to work as a member of a group or leader.
ECM501.6	Write and present their work effectively with ethical values.
ECC601	Electromagnetics and Antenna
ECC601.1	Explain the electromagnetic field including static and dynamic in terms of Maxwell's equations.
ECC601.2	Apply Maxwell's equation to solve various electromagnetic phenomena.
ECC601.3	Explain the fundamentals of Antennas, EM wave radiation, and linear wire antenna elements.
ECC601.4	Design different types of Antenna arrays.



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ECC601.5	Explain the working of special types of Antennas and their properties.
ECC601.6	Describe the concept of radio wave propagation.
ECC602	Computer Communication Networks
ECC602.1	Explain network topologies, hardware devices, addressing schemes, and protocol stacks.
ECC602.2	Compare various transmission media and broadband technologies.
ECC602.3	Analyze the flow control, error control, and medium access control techniques.
ECC602.4	Design computer networks using IP addressing and subnetting schemes.
ECC602.5	Analyse connection-oriented and connectionless services.
ECC602.6	Describe application layer protocols.
ECC603	Image Processing and Machine Vision
ECC603.1	Apply basic fundamentals of image processing for various applications
ECC603.2	Analyze image enhancement using spatial and frequency domain techniques.
ECC603.3	Analyze images using morphology and restoration techniques.
ECC603.4	Apply image segmentation algorithms based on the principle of discontinuity and similarity
ECC603.5	Explain the concept of machine vision and descriptors
ECC603.6	Describe machine vision algorithms for image classification.
ECC604	Artificial Neural Network and Fuzzy Logic
ECC604.1	Apply the basic concepts of neural networks in applications.
ECC604.2	Analyse the supervised learning algorithms.
ECC604.3	Analyse Unsupervised Learning algorithms for Mean Square Error and Sum Squared Error, Gradient Descent
ECC604.4	Explain the basic concept of Machine Learning and its algorithms.
ECC604.5	Understand and explain the architecture of CNN and its application in image classification.
ECC604.6	Analyze the application of neural networks and fuzzy logic to real-world problems.
ECCDLO6014	Database Management System
ECCDLO6014.1	Describe the fundamentals of database systems, different data models, and design issues in databases.



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ECCDLO6014.2	Design ER diagram & relational schema for the problem definition
ECCDLO6014.3	Differentiate between Relational Algebra and calculus for computational capabilities and apply concepts of normalization.
ECCDLO6014.4	Implement views, and constraints and query the database using SQL to retrieve the data from the database
ECCDLO6015	IoT and Industry
ECCDLO6015.1	Explain the Basics of IoT & M2M communication using Case Studies.
ECCDLO6015.2	Illustrate various protocols of web connectivity.
ECCDLO6015.3	Understand and use tools for data management and analytics in IoT.
ECCDLO6015.4	Explain various frameworks for industry 4.0 standards.
ECCDLO6015.5	Illustrate case studies on applications of IIOT.
ECCDLO6015.6	Understand advanced concepts and applications of industry 4.0
ECL601	Electromagnetics and Antenna Lab
ECL601.1	Demonstrate the radiation pattern plot and calculate beam width, front/back ratio, and gain of wire antennas.
ECL601.2	Design and analyze the performance of antenna arrays for given specifications using MATLAB
ECL601.3	Demonstrate the radiation pattern plot and calculate beam width, front/back ratio, and gain of reflector antenna
ECL601.4	Design and analyze the performance of Microstrip antenna for given specifications using simulation software HFSS.
ECL601.5	Demonstrate the radiation pattern plot and calculate beam width, front/back ratio, and gain of Horn antenna
ECL601.6	Design and analyze the radiation patterns of antennas using simulation software 4NEC2.
ECL602	Computer Communication Networks Lab
ECL602.1	Demonstrate knowledge of small or medium-sized computer network that meets a customer 's specific needs.
ECL602.2	Perform configurations on routers and Ethernet switches.
ECL602.3	Compare routing algorithms and protocols.
ECL602.4	Simulate computer networks for services and analyze the simulation results.
ECL602.5	Troubleshoot connectivity problems in a host occurring at multiple layers of the OSI model.
ECL602.6	Analyse connectionless and connection-oriented services and protocols.



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ECL603	Image Processing and Machine Vision Lab
ECL603.1	Analyze grayscale resolution using point processing algorithms in python.
ECL603.2	Implement histogram equalization for image enhancement using Python
ECL603.3	Analyze spatial domain and frequency domain filtering for image enhancement using Python.
ECL603.4	Apply morphological operations for various image processing applications using Python.
ECL603.5	Apply basic concepts of Neural Networks for image processing using Python.
ECL603.6	Apply image processing base algorithms for real-time applications.
ECL604	Skill Lab: Linux and Networking and Server Configuration
ECL604.1	Demonstrate installation Linux using Debian, Ubuntu, or Kali Linux platform and execute standard Linux commands.
ECL604.2	Implement Process management, scheduling, and Inter-process communication in Linux.
ECL604.3	Implement shell script programs for common administrative tasks and managing user accounts.
ECL604.4	Implement shell script programs for conditional and looping statements in bash.
ECL604.5	Configure DHCP server, DNS server, and NFS file server.
ECL604.6	Configure and Deploy Mail server, Telnet server, FTP server, and Web server.
ECM601	Mini Project 2B- FPGA-based Projects
ECM601.1	Understand various FPGA families and methods of FPGA synthesis and implementation.
ECM601.2	Identify problems based on societal, research, and industry needs.
ECM601.3	Investigate the problem thoroughly and propose an appropriate solution to solve the problem.
ECM601.4	simulate and synthesize circuits in Verilog HDL.
ECM601.5	Develop interpersonal skills to work as a member of a group or leader
ECM601.6	Write and present their work effectively with ethical values.
ECC701	Microwave Engineering
ECC701.1	Illustrate transmission line parameters and design distributed Impedance matching networks.



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ECC701.2	Analyze the different modes of rectangular waveguides for the various parameters.
ECC701.3	Analyze the waveguide multiport junctions and their applications.
ECC701.4	Analyze the microwave linear and cross-field tubes for various parameters.
ECC701.5	Illustrate the working principle of microwave semiconductor devices.
ECC701.6	Describe the different microwave measurement techniques for different parameters.
ECC702	Mobile Communication System
ECC702.1	Explain the cellular fundamentals and estimate the coverage and capacity of cellular systems
ECC702.2	Classify different types of propagation models and analyze the link budget.
ECC702.3	Compare and contrast GSM, GPRS, HSCSD, EDGE, and IS-95 Technologies
ECC702.4	Apply the concepts of 3G technologies for UMTS and CDMA 2000.
ECC702.5	Describe the features and working principles of 3GPP LTE.
ECC702.6	Discuss the emerging technologies for upcoming mobile communication systems.
ECCDLO 7012	Deep Learning
ECCDLO 7012.1	Understand the fundamentals of Deep Learning.
ECCDLO 7012.2	Apply knowledge of deep Learning in TensorFlow.
ECCDLO 7012.3	Apply the Regularization and Optimization techniques of deep learning models.
ECCDLO 7012.4	Compare architectures of Convolution Neural Networks based on its evaluation parameters.
ECCDLO 7012.5	Analyze the Architecture of Recurrent Neural Network and its application.
ECCDLO 7012.6	Able analyse the types of Autoencoders and their real-life applications
ECCDLO 7013	Cloud Computing
ECCDLO 7013.1	Explain the fundamentals of cloud computing.
ECCDLO 7013.2	Interpret the significance of virtualization in the context of cloud computing
ECCDLO 7013.3	Illustrate cloud computing services working on AWS, Azure, and Google Cloud platforms



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ECCDLO 7013.4	Determine design aspects of cloud computing for Various services.
ECCDLO 7013.5	Interpret security aspects of cloud computing.
ECCDLO 7013.6	Use of cloud computing in emerging technology.
ECCDLO 7023	Internet Communication Engineering
ECCDLO 7023.1	Explain internet standards and architecture model
ECCDLO 7023.2	Illustrate application layer protocols in the internet
ECCDLO 7023.3	Justify the internet security protocols to address safety concerns in the society.
ECCDLO 7023.4	Illustrate relevant protocols and compression algorithms for various multimedia standards
ECCDLO 7023.5	Compare integrated & and differentiated service models for quality of service.
ECCDLO 7023.6	Discuss new networking trends in industry and automation.
ECL701	Microwave Engineering Lab
ECL701.1	Analyse S-parameters and design distributed types of Impedance matching Networks.
ECL701.2	Design the transmission lines using simulation software.
ECL701.3	Design rectangular waveguide using simulation software.
ECL701.4	Demonstrate the characteristics of waveguide junctions.
ECL701.5	Analyze characteristics of different modes of Reflex Klystron.
ECL701.6	Determine the VSWR, Frequency, and wavelength of the signal.
ECL702	Mobile Communication System Laboratory
ECL702.1	Demonstrate the effect of cellular system design parameters on system capacity and quality of service.
ECL702.2	Implement orthogonal codes of length n for 2G and G mobile systems and verify properties.
ECL702.3	Analyze the effect of load on call blocking probability in GSM and CDMA systems
ECL702.4	Examine the effect of small-scale fading parameters on the performance of radio channel characteristics.
ECL702.5	Analyse link budget for various propagation path-loss models.
ECL702.6	Analyze the effect of multipath diversity on Bit Error Rate.
ECC801	Optical Communication and Networks
ECC801.1	Explain the significance of fiber optic communication, its merits.
ECC801.2	Analyze transmission characteristics of optical fiber Communication.



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ECC801.3	Illustrate the working principles and characteristics of Optical Sources and detectors.
ECC801.4	Distinguish network system components and Multiplexing Schemes SDH, PDH, and WDM for Different real-time applications
ECC801.5	Illustrate the concept of optical packet-switching and Access Networks.
ECC801.6	Describe the transmission system model, network management functions, and next-generation optical networks.
ECCDLO 8013	Wireless Networks
ECCDLO 8013.1	Explain fundamental architecture, design issues, and standards of wireless networks.
ECCDLO 8013.2	Compare different types of Personal Area Network (PAN) technologies such as ZigBee, Bluetooth, UWB, NFC and 6LoWPAN.
ECCDLO 8013.3	Analyze different LAN topologies, technologies, and ad hoc networks.
ECCDLO 8013.4	Compare various types of network protocols, ad hoc Vehicle networks and Wireless MANs.
ECCDLO 8013.5	Evaluate the planning and design of the Performance of GSM and CDMA systems in Wireless WANs.
ECCDLO 8013.6	Explain the basic network architecture of Wireless sensor Networks for IoT applications.
ECCDLOC 8023	Network Management in Telecommunication
ECCDLOC 8023.1	Understand the concepts of network management in telecommunications (NMT), architectures, and protocols.
ECCDLOC 8023.2	Differentiate between network management models.
ECCDLOC 8023.3	Apply network management fundamental principles in TCP/IP.
ECCDLOC 8023.4	Understand the TMN framework.
ECCDLOC 8023.5	Understand the network management TMN management services.
ECCDLOC 8023.6	Describe Broadband networks, its services, and ATM
ECL801	Optical Communication and Networks Laboratory
ECL801.1	Observe different parameters for the propagation of light inside the optical fiber.
ECL801.2	Illustrate fiber optic links to find propagation losses.
ECL801.3	Observe the performance characteristics of the optical source and detector.



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ECL801.4	Illustrate the optical link to find bandwidth.
ECL801.5	Estimate link power and rise time budget in optical Network.
ECL801.6	Implement an optical network using the simulator.
ECP801	Major Project-II
ECP801.1	Explore beyond the curriculum to identify the problem of society, industrial or research needs to investigate the problem through an in-depth literature survey and propose appropriate solutions to solve the problem.
ECP801.2	Implement the methodology with modern tools and provide sustainable solutions with effective utilization of the resources available.
ECP801.3	Analyze and compare the results with the standard results.
ECP801.4	Work as an individual and contribute as a team member with Effective management skills to achieve a common objective.
ECP801.5	Write and present their work effectively with ethical values.
ECP801.6	Engage themselves in areas of their interest by applying the knowledge gained and explore new technical trends.



A. Ruperec

Dr. Amtria Ruperec

(HoD, EXTC)

HEAD

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