Course Outcomes of SPD

Sr. No.	Course Code & Title	Course Outcomes	
1	**Advanced Digital Signal Processing (SPD501)**	SPD501.1	Comprehend the DFT's and FFT's
		SPD501.2	Design and analyze the digital filters
		SPD501.3	Acquire the basics of multirate digital signal processing
		SPD501.4	Analyze the power spectrum estimation
		SPD501.5	Comprehend the finite word length effects in fixed point DSP systems
		SPD501.6	Apply the algorithm for wide area of recent applications
2	**Image Analysis and Processing (SPD503)**	SPD503.1	Define image acquisition, sampling, quantization, 2D signals and systems, and basics of color image processing.
		SPD503.2	Explain the mathematical tools used for digital manipulation of images.
		SPD503.3	Employ preprocessing, enhancement, filtering and noise removal techniques.
		SPD503.4	Distinguish spatial domain and frequency domain filtering, enhancement and restoration.
		SPD503.5	Evaluate and defend various application specific techniques for enhancement, denoising, morphology, segmentation, and compression.
		SPD503.6	Identify, formulate a wide range of real-world problems including representation, description, and recognition and further design and develop solutions to these problems.
3	**Wavelet in Signal Processing (SPD5303)**	SPD5303.1	Expain concept and theory of wavelets and synthesize the filters.
		SPD5303.2	Explaination and understand of different type of ECG and EEG signals and its anlysis.
		SPD5303.3	To understand the various wavelet transforms and their energy components.
		SPD5303.4	Illustratration of different type of wavetets and their wavelets
		SPD5303.5	Apply wavelet, filterbanks and multiresolution techniques to a problem.
		SPD5303.6	Think critical and apply the wavelets in problem solving technique and research.
4	**Advanced Digital System Design (SPD5403)**	SPD5403.1	Generate new Digital Systems based on FPGAs using Hardware Description Languages
		SPD5403.2	Design the synchronous sequential circuits and finite state machines
		SPD5403.3	Analyze combinational digital circuits for various type of faults
		SPD5403.4	Design asynchronous sequential circuits without hazards.
		SPD5403.5	Describe the digital systems in the form of algorithmic state machines.

5	**Wireless Communication (SPD5401)**	SPD5401.1	To analyze the effects of radio propagation path loss, fading, shadowing in wireless communication.
		SPD5401.2	To compute the capacity of AWGN and Faded Wireless Channels
		SPD5401.3	To evaluate error performance for different wireless channel scenarios
		SPD5401.4	Design different diversity technique based receivers
		SPD5401.5	To assess the performance of cellular systems for multiple access and interference management
		SPD5401.6	To create next generation wireless system using MIMO, OFDM and Beamforming principles
6	**Digital Watermarking (SPD5301)**	SPD5301.1	Appraise & classify the generic models' watermarking system in cover data with message coding.
		SPD5301.2	Demonstrate the geometric models of watermarking
		SPD5301.3	Examine the error correction codes & multi-symbol messaging watermarking.
		SPD5301.4	Develop & evaluate the efficient and anonymous buyer–Seller Watermarking protocol of the digital watermarking models in cover data.
		SPD5301.5	Develop Quantization & spread spectrum watermarking.
		SPD5301.6	Apply the affine transformation resistant, audio, binary image, and Video Watermarking.
7	**Seminar (SPD5201)**	SPD5201.1	Demonstrate technical knowledge of the selected seminar topic.
		SPD5201.2	Develop a thorough literature survey to describe previous related work, and identify research gaps, problem formulation, and solutions for the selected topic.
		SPD5201.3	Prepare a technical document/ report in a specified format with well-mentioned and appropriate citations, references and key concepts.
		SPD5201.4	Produce the presentation materials effectively and creatively for disseminating the content and information of the selected topic.
		SPD5201.5	Demonstrate practical soft skills to communicate with insight and clarity in multi-disciplinary groups.
8	**Pattern Analysis and Machine Intelligence (SPD502)**	SPD502.1	Explain and compare a variety of pattern classification, structural pattern recognition, and pattern classifie combination techniques.
		SPD502.2	Summarize, analyze and relate research in the pattern recognition area.
		SPD502.3	Apply performance evaluation methods for pattern recognition and critique comparisons of methods.
		SPD502.4	Apply pattern recognition techniques to real-world problems such as document analysis and recognition.
		SPD502.5	Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.

9	**Embedded System (SPD504)**	SPD504.1	Comprehend basic principles of a microcontroller and identify its need.
		SPD504.2	Identify basic architecture of a 8-bit, 16-bit and 32 bit Microcontroller and demonstrate programming skills using PIC and ARM microcontroller.
		SPD504.3	Describe the internal architecture and interfacing of different peripheral devices with Microcontrollers.
		SPD504.4	Illustrate the need and working principles of Digital Signal Processors and their variants
		SPD504.5	Discuss memory organization of ARM Microcontroller and its variants' Bus structure
10	**Computer Vision (SPD5402)**	SPD5402.1	To describe the concepts of artificial intelligence and image processing in computer vision, and camera sensors and its calibrations.
		SPD5402.2	To discuss and compare different three-dimensional imaging geometry and scene understanding.
		SPD5402.3	To illustrate various shape and region analysis, and feature matching.
		SPD5402.4	To discuss and compare different object detection and recognition techniques.
		SPD5402.5	To construct various feature detectors and descriptors in computer vision.
		SPD5402.6	To discuss and analyze various clustering and classification models in computer vision.
		SPD5402.7	To discuss and analyze various object motion and tracking techniques.
		SPD5402.8	To evaluate various three-dimensional vision algorithms.
11	**VLSI SIGNAL PROCESSING ARCHITECTURE (SPD5208)**	SPD5208.1	Apply performance optimization techniques in VLSI signal processing
		SPD5208.2	Transformation for high speed and power deduction using pipelining, retiming, parallel processing, techniques.
		SPD5208.3	Analyze techniques for voltage reduction as well as for strength or capacitance reduction
		SPD5208.4	Apply area reduction techniques using folding techniques, strategies for airthmatic implementation
		SPD5208.5	Elaborate synchronous, wave, and asynchronous pipelining
12	**Speech Processing (SPD5406)**	SPD5406.1	Analyse the speech production mechanism.
		SPD5406.2	Illustrate the signal processing methods for speech recognition.
		SPD5406.3	Apply various features extraction methods in time and frequency domain on speech signals
		SPD5406.4	Design speech recognition system and identify implementation issues.
		SPD5406.5	Understand models for automatic speech recognition

13	**Research Methodology & Report Writing (SPD5202)**	SPD5202.1	Prepare a literature review for formulation and evaluation of research questions.
		SPD5202.2	Demonstrate the research process design.
		SPD5202.3	Develop and test null & alternate hypothesis for single/double tailed sample distribution for known and unknown variance.
		SPD5202.4	Discriminate the key elements of a research report.
		SPD5202.5	Interpret the need of sampling and categorizes the sampling methods.
		SPD5202.6	Demonstrate the ability to choose methods appropriate to research design.
14	**MINOR PROJECT (SPD5302)**	SPD5302.1	Identify the problem statement through literature survey and formulate the project statement
		SPD5302.2	Develop a methodology and design strategy to implement the project
		SPD5302.3	Design/Fabricate/Implement using state-of-the-art tools and components in stipulated timeline
		SPD5302.4	Demonstrate the outcome / prototype
		SPD5302.5	Effective report writing including scope for further extension
15	**Digital Design and verification (SPD6407)**	SPD 6407.1	Describe spice model of CMOS transistor with parasitic capacitance
		SPD 6407.2	Design and analyse combinational logic circuits using spice simulation
		SPD 6407.3	Sequential logic Circuit design and analyse using Spice model
		SPD 6407.4	Design and simulation of memory device
16	**Data Analysis (SPD6301)**	SPD6301.1	Explain the fundamental techniques and principles of data analytics.
		SPD6301.2	Implement statistical analysis techniques and visualize the outcomes.
		SPD6301.3	Evaluate the sample distributions using hypothesis testing.
		SPD6301.4	Apply linear and multiple linear regression analysis.
		SPD6301.5	Compare different paradigms for supervised and unsupervised learning methods.
		SPD6301.6	Design efficient algorithms to solve real-world problems

17	**Multirate Signal Processing (SPD6203)**	SPD6203.1	Understand the fundamentals of multirate signal processing and its applications.
		SPD6203.2	Learn the theory of sampling rate conversion and develop methods for decimating, interpolating, and changing the sampling rate of the signal and to develop efficient polyphase implementations of sampling rate converters.
		SPD6203.3	Explore multirate filter banks and develop understanding of both theoretical and practical aspects of multirate signal processing.
		SPD6203.4	Design perfect reconstruction and near perfect reconstruction filter bank system
		SPD6203.5	Analyse the quantization effects in filter banks.
18	**MAJOR PROJECT-I (SPD601)**	SPD601.1	Identify the problem statement through literature survey and formulate the project statement
		SPD601.2	Develop a methodology and design strategy to implement the project
		SPD601.3	Design/Fabricate/Implement using state-of-the-art tools and components in stipulated timeline
		SPD601.4	Demonstrate the outcome / prototype
		SPD601.5	Effective report writing including scope for further extension
19	**MAJOR PROJECT-II (SPD602)**	SPD602.1	Identify the problem statement through literature survey and formulate the project statement
		SPD602.2	Develop a methodology and design strategy to implement the project
		SPD602.3	Design/Fabricate/Implement using state-of-the-art tools and components in stipulated timeline
		SPD602.4	Demonstrate the outcome / prototype
		SPD602.5	Effective report writing including scope for further extension