माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Department of Electronics Engineering

Name of Course with Code: Data Science (2200511/2140511)	**Class: III Year (V Sem)**	**Session: July-December 2024**

S. No.	Unit	Content to be Covered	Teaching Session	CO Level	Mode
1.	Unit I	Need for data science, benefits and uses, facets of data	1	1	Black Board Teaching & problem solving based learning
2.		Data science process	2	1	Black Board Teaching & problem solving based learning
3.		Introduction of basics python tool, Setting working Directory	3	1	Black Board Teaching/Slides
4.		Creating and saving a script file, File execution	4	1	Black Board Teaching/Slides
5.		Removing variables from environment, clearing environment, Commenting script files	5	1	Black Board Teaching/Slides
6.		Variable creation	6	1	Black Board Teaching/Slides
7.		Data types and associated operations	7	1	Black Board Teaching/Slides
8.		Arithmetic and logical operators	8	1	Black Board Teaching/Slides
9.	Unit II	Control structures	9	2	Black Board Teaching/Slides
10.		Loop, Functions	10	2	Black Board Teaching & problem solving based learning
11.		Data structures: Lists, Arrays, Tuples, Dictionary, Sets,	11	2	Online & demonstration based learning
12.		NumPy library	12	2	Black Board Teaching & problem solving based learning
13.		Data Collection: Getting to know your data	13	2	Online & demonstration based learning
14.		Types of Data	14	2	Online & demonstration based learning
15.		Data collection strategies	15	2	Online & demonstration based learning
16.		Data Preprocessing, Feature engineering	16	2	Online & demonstration based learning
17.		Exploratory Data Analytics	17	2,3	Online & demonstration based learning
18.		Descriptive Statistics	18	3	Black Board Teaching & problem solving based learning

19.	**Unit III**	Mean, Standard Deviation, Skewness and Kurtosis	19	3	Black Board Teaching &Learning through projects
20.		Inferential statistics: hypothesis testing	20	3	Online & demonstration based learning
21.		Probability: probability theory	21	3	Black Board Teaching & problem solving based learning
22.		Conditional probability	22	3	Black Board Teaching & problem solving based learning
23.		Pandas library, dataframe and dataframe related operations	23	3	Black Board Teaching &Learning through experimentation
24.		Reading files	24	3	Black Board Teaching & problem solving based learning
25.	**Unit IV**	Data Cleaning and Preparation	25	4	Black Board Teaching & problem solving based learning
26.		Handling Missing Data	26	4	Black Board Teaching & Open discussions
27.		Data Transformations using pandas and sklearn library	27	4	Black Board Teaching & problem solving based learning
28.		Removing Duplicates, Replacing Values	28	4	Black Board Teaching / Slides &Group based Learning
29.		Detecting Outliers	29	4	Black Board Teaching / Activitybased learning
30.		Data visualization on different dataset using matplotlib and seaborn libraries	30	4	Black Board Teaching / Slides
31.		Scatter plot, Line plot, Bar plot, Histogram, Box plot, Pair plot	31	4	Black Board Teaching/Slides
32.	**Unit V**	Supervised learning: Regression	32	5	Black Board Teaching & problem solving based learning
33.		Classification	33	5	Black Board Teaching & problem solving based learning
34.		Linear regression	34	5	Black Board Teaching & problem solving based learning
35.		Logistic regression	35	5	Black Board Teaching & problem solving based learning
36.		Decision tree, tree creation with entropy and information gain	36	5	Black Board Teaching & problem solving based learning
37.		ID3 algorithm	37	5	Black Board Teaching & problem solving based learning
38.		Random forest, naïve bayes theorem	38	5	Black Board Teaching & problem solving based learning
39.		K-nearest neighbor and ensemble methods for solving real world problems	39	5	Black Board Teaching & problem solving based learning
40.		Unsupervised learning: Clustering, Reinforcement learning.	40	5	Black Board Teaching & problem solving based learning

Offline

Online	Black Board Teaching/Slides	Group based Learning	Learning through projects	Learning through demonstration	Learning through experimentation	Activity /Problem based Learning	Onsite/field based learning/Open Discussion
8.75%	53.75%	1.3%	1.3%	8.75%	1.3%	23.75%	1.3%

Dr. R. K.Suji

Dr. Shubhi Kansal

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DEPARTMENT OF ELECTRONICS ENGINEERING

Multiple Mode Teaching Learning Pattern

Name of Course with Code: Mobile Communication & 5G Network **(2140512/2200512)**	**Class:** B. Tech. III[rd] Year	**Session:** July-Dec 2024

S. No.	Unit	Content to be Covered	Teaching Session	Mode
1.	**Unit 1**	Introduction to cellular mobile systems: Basic Cellular System,	1	Offline & activity based learning
2.		Cellular communication infrastructure: Cells, Clusters, Cell Splitting	2	Offline & Open discussions
3.		Frequency reuse concept, Cellular system components.	3	Offline & Open discussions
4.		Fixed and dynamic, Cellular interferences: Co-Channel and adjacent channel and sectorization.	4-5	Offline & Experiment with problem solving in group based learning
5.		Operations of cellular systems, Handoff/Handover, Channel assignment	6	Online & demonstration based learning
6.		Problem Solving Session	7	Offline & Open discussions
7.	**Unit 2**	Properties of mobile radio channels – Intersymbol interference	8-9	Offline & problem solving based learning
8.		Multipath and fading effects	10	Offline & problem solving based learning
9.		Interleaving and diversity	11	Online & demonstration based learning
10.		Multiple access schemes (TDMA, FDMA)	12	Offline & problem solvingbased learning
11.		CDMA, SDMA	13	Offline & problem solving based learning
12.		Interuser interference	14	Offline & problem solving based learning
13.		Traffic issues and cell capacity	15	Offline & Experiment with problem solving in group based learning
14.		Problem Solving Session	16	Offline & Open discussions
15.		Pulse shaping, Linear and non-linear Modulation techniques	17	Offline & Onsite/ field visit based Learning
16.		Constant Envelop modulation,	18	Offline & Onsite/ field visit based Learning
17.		QPSK, MSK, GMSK	19	Offline & Open discussions

18.	**Unit 3**	Spread spectrum modulation techniques	20	Online & demonstration based learning

19.		Direct sequence and Frequency Hopping Spread Spectrum and their applications.	21-22	Offline & Onsite/ field visit based Learning
20.		Problem Solving Session	23	Offline & Open discussions
21.		2G Architecture such as GSM and CDMA based – 2.5G	24	Online & demonstration based learning
22.		GPRS: GPRS and its features	25	Online & demonstration based learning
23.		3G standard details such as UMTS	26-27	Offline & Open discussions
24.		Introduction to LTE	28	Online & demonstration based learning
25.	**Unit 4**	Basic concept of massive MIMO.	29	Online & demonstration based learning
26.		5G potential and applications	30	Offline & Open discussions
27.		Usage scenarios: enhanced mobile broadband (eMBB),	31	Offline & activity based learning
28.		ultra reliable low latency communications (URLLC)	32	Online & demonstration based learning
29.		massive machine type communications (MMTC)	33	Offline & Experiment with problem solving in group based learning
30.	**Unit 5**	D2D communications,	34	Offline & Open discussions
31.		V2X communications; Spectrum for 5G and sharing	35	Offline & Onsite/ field visit based Learning

Online	Offline						
	Black Board Teaching	Group based Learning	Learning through projects	Learning through demonstration	Learning through experimentation	Activity based Learning	Onsite/field basedlearning
20.93%	69.77%	37.21%	13.95	27.90%	48.84.%	13.95%	08.30%

Prof. Prateek Bhadauria

Prof. Rachit Jain

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DEPARTMENT OF ELECTRONICS ENGINEERING

Multiple Mode Teaching Learning Pattern

Name of Course with Code: **VLSI Design** (2140515/2200515)	**Class:** B. Tech. III Year	**Session:** July- December 2024

S. No.	Unit	Content to be Covered	Teaching Session	Mode
1.	Unit 1	The Metal Oxide Semiconductor (MOS) Structure	1	Offline & Open discussions
2.		The MOS System under External Bias, Structure and Operation of MOS Transistor (MOSFET)	2-3	Offline & problem solving based learning
3.		MOSFET Current-Voltage Characteristics	4-5	Offline & problem solving based learning
4.		MOSFET Scaling and Small-Geometry Effects	6-7	Offline & problem solving based learning
5.		MOSFET Capacitances.	8-9	Offline & problem solving based learning
6.	Unit 2	Introduction, Voltage Transfer Characteristic (VTC)	10	Offline & problem solving based learning
7.		Noise Immunity and Noise margins Resistive-Load Inverter, Inverters with n-Type MOSFET Load and CMOS Inverter,	11-12	Offline & problem solving based learning
8.		DC Characteristics of CMOS Inverter, Calculation of VIL, VIH, VOL, VOH and Vth, Design of CMOS Inverters	13-14	Offline & problem solving based learning
9.		Supply Voltage Scaling in CMOS Inverters, Power and Area considerations.	15	Offline & problem solving based learning
10.	Unit 3	Switching Characteristics of CMOS Inverter- Delay-Time Definitions	16	Online & demonstration based learning
11.		CMOS Propagation Delay	17	Online & demonstration based learning
12.		Calculation of Delay times, Power Dissipation-Switching	18-19	Offline & problem solving based learning
13.		Short-Circuit and Leakage Components of Energy and Power, Power-DelayProduct	20-24	Offline & problem solving based learning
14.		Combinational MOS logic circuits	25	Online & demonstration based learning
15.		CMOS Logic circuits (NAND, NOR and Complex Logic Gates, Multiplexers etc.)	26	Offline & problem solving based learning

16.	**Unit 4**	CMOS Transmission Gates (Pass Gates), CMOS n-Well Process,	27-29	Offline & problem solving based learning
17.		Layout design rules, layout design of CMOS Inverter, designing of stick diagram.	30-31	Offline & demonstration based learning
18.	**Unit 5**	Semiconductor memories: non-volatile and volatile memory devices, flash memories	32	Offline & Open discussions
19.		SRAM cell design,	33	Offline & problem solving based learning
20.		1T DRAM cell design, dynamic CMOS logic circuits, domino logic CMOS circuits	34-35	Offline & problem solving based learning

Online	Offline						
	Black Board Teaching	Group based Learning	Learning through projects	Learning through demonstration	Learning through experimentation	Activity based Learning	Onsite/field based learning
13.22%	85.71%	37.21%	13.95	27.90%	48.84.%	13.95%	%

Dr. Varun Mishra **Dr. Varun Sharma**

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LECTURE PLAN

Name of Course with Code: **Electromagnetic Fields (2140519/2200519)**	**Class: B. Tech. III Year (V Sem)**	**Session: July-December 2024**

Teaching Session	Content to be Covered	CO's	Blooms Level (BL)	% Coverage (to be calculated based on the total syllabus)	Mode
1.	Introduction to Coulomb's Law	CO1	L2	3%	Offline / Black Board Teaching
2.	Electric Field Intensity	CO1	L3	2%	Offline / Black Board Teaching
3.	Numerical problems on Coulomb's Law and Electric Field Intensity	CO1	L4	3%	Group based Learning
4.	Coordinate Systems: Rectangular, Cylindrical and Spherical Coordinate Systems	CO1	L3	3%	Offline / Black Board Teaching
5.	Charge distribution: Line charge distribution	CO1	L3	3%	Online mode
6.	Electric Field Intensity due to Surface and Volume Charge Distribution	CO1	L4	3%	Offline / Black Board Teaching
7.	Electric flux and flux density, Gauss law, Boundary relations	CO1	L3	3%	Offline / Black Board Teaching
8.	Curl of a vector field and Stoke's Theorem	CO1	L3	3%	Offline / Black Board Teaching
9.	Gradient of a Scalar function, Poisson and Laplace Equations	CO1	L3	3%	Offline / Black Board Teaching
10.	Conservative nature of Electrostatic Field and Equation of Continuity, Electric Field in dielectric and conductor	CO1	L3	2%	Online mode
11.	Static Magnetic Field	CO2	L3	3%	Offline / Black Board Teaching
12.	Magnetic Field Intensity-Biot-Savart's Law	CO2	L3	3%	Offline / Black Board Teaching
13.	Magnetic Field due to a current element	CO2	L5	2%	Offline / Black Board Teaching
14.	Ampere's Circuital Law and Magnetic Potentials	CO2	L5	2%	Offline / Black Board Teaching
15.	Numerical problems on Magnetic field	CO2	L4	2%	Group based Learning
16.	Boundary conditions in magnetic field, Scalar and vector potential, Poisson's equation	CO3	L2	2%	Offline / Black Board Teaching

17.	Magnetic force, force between current carrying wires	CO3	L2	2%	Online mode
18.	Maxwell's equations for steady, time varying field	CO3	L2	3%	Online mode
19.	Maxwell's equations for time harmonic fields	CO3	L3	3%	Offline / Black Board Teaching
20.	General wave equation	CO4	L3	2%	Online mode
21.	Uniform plane wave in free space	CO4	L3	2%	Offline / Black Board Teaching
22.	Uniform plane wave in Perfect dielectric	CO4	L3	3%	Offline / Black Board Teaching
23.	Uniform plane wave in Lossy medium	CO4	L3	3%	Online mode
24.	Uniform plane wave in conducting medium	CO4	L2	2%	Offline / Black Board Teaching
25.	Concept of Skin depth and Poynting vector	CO4	L3	2%	Online mode
26.	Derivation of Poynting vector theorem	CO4	L5	3%	Offline / Black Board Teaching
27.	Wave Polarization- Introduction	CO4	L3	3%	Online mode
28.	Linear polarization	CO4	L5	3%	Offline / Black Board Teaching
29.	Elliptic polarization	CO4	L5	3%	Offline / Black Board Teaching
30.	Circular polarization	CO4	L5	3%	Offline / Black Board Teaching
31.	Numerical problems on wave propagation	CO4	L4	2%	Group based Learning
32.	Introduction to reflection of waves	CO5	L2	2%	Offline / Black Board Teaching
33.	Reflection of uniform plane waves	CO5	L2	2%	Offline / Black Board Teaching
34.	Normal Incidence	CO5	L2	2%	Offline / Black Board Teaching
35.	Oblique Incidence	CO5	L2	2%	Offline / Black Board Teaching
36.	Total transmission phenomena	CO5	L5	3%	Learning through experimentation
37.	Total internal reflection	CO5	L5	3%	Learning through experimentation
38.	Critical angle	CO5	L4	3%	Activity based
39.	Brewster angle	CO5	L4	2%	Activity based
40.	Numerical problems on Reflection of waves	CO5	L4	2%	Group based Learning

Online	Offline				
	Black board teaching	**Group based Learning**	**Learning through experimentation**	**Activity based Learning**	**Onsite/field basedlearning**
20%	61%	9%	6%	4%	-

Dr. R. K.Suji

Dr. Laxmi Shrivastava

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DEPARTMENT OF ELECTRONICS ENGINEERING

Multiple Mode Teaching Learning Pattern

Name of Course with Code: Digital Signal Processing (**2140520/2200520**)	**Class:** B. Tech. III Year	**Session: July-Dec 2024**

S. No.	Unit	Content to be Covered	Teaching Session	Mode
1.	Unit 1	Review of discrete time signals and systems	1	Offline & Open discussions
2.		Properties and applications of discrete time Fourier transform	2	Offline & activity based learning
3.		Review of Z transform	3	Offline & Open discussions
4.		Analysis of minimum phase	4-5	Offline & Experiment with problem solving in group based learning
5.		Maximum phase and inverse system.	6	Online & demonstration based learning
6.	Unit 2	Introduction and properties of DFT.	7	Offline & problem solving based learning
7.		Computation of circular convolution using DFT.	8	Offline & problem solving based learning
8.		Decimation in time FFT algorithm.	9	Offline & problem solving based learning
9.		Decimation of frequency FFT algorithm with radix-2.	10	Offline & problem solving based learning
10.		Decimation of frequency FFT algorithm with radix-4.	11	Offline & problem solving based learning
11.		Review of Unit-II	12	Online
12.	Unit 3	Characteristics of practical frequency selective filters.	13	Offline & Experiment with problem solving in group based learning
13.		Various signal flow graph structure of IIR filters.	14	Offline & Experiment with problem solving in group based learning
14.		IIR Filter design.	15	Offline & Experiment with problem solving in group based learning
15.		Overview of Butterworth	16	Offline & Experiment with problem solving in group based learning
16.		Chebyshevand Elliptic Approximations.	17	Offline & Experiment with problem solving in group

				based learning
17.		Design of discrete time IIR filters using Impulse invariant.	18	Offline & Open discussions
18.		Bilinear transformation Methods.	19	Offline & Experiment with problem solving in group based learning
19.		Spectral transformation of IIR filters.	20	Offline & Experiment with problem solving in group based learning
20.	**Unit 4**	Introduction and Signal flow graph structure of FIR Filter.	21	Offline & Experiment with problem solving in group based learning
21.		Symmetric, and Asymmetric FIR filters.	22	Offline & Experiment with problem solving in group based learning
22.		Design of linear phase FIR filters using windows.	23	Offline & Learning through projects
23.		Frequency sampling method.	24	Online & demonstration based learning
24.		Design of Optimum Equiripple linear phase FIR filters.	25	Offline & group based learning
25.		Design of FIR differentiators.	26	Online & demonstration based learning
26.	**Unit 5**	Introduction	27	Online & demonstration based learning
27.		Decimation and Interpolation.	28	Offline & group based learning
28.		Sampling rate conversion by a Rational factor.	29	Online & demonstration based learning
29.		Sampling rate conversion with Cascaded integrator.	30	Offline & Experiment with problem solving in group based learning
30.		Comb filters	31	Offline & Open discussions
31.		Polyphase structures for decimation.	32	Offline & Onsite/ field visit based Learning
32.		Interpolation filters.	33	Offline & Onsite/ field visit based Learning
33.		Application of multirate signal processing.	34	Offline & Onsite/ field visit based Learning
34.		Review of Unit-V	35	Online & demonstration based learning

Online	Offline						
	Black Board Teaching	Group based Learning	Learning through projects	Learning through demonstration	Learning through experi-mentation	Activity based Learning	Onsite/field based learning
20.8	13.42	7.71	2.85	1.85	31.42	11.42	10.42

Dr. Mukesh Kumar Mishra

Dr. R. P. Narwaria