



National Institute of Technology Meghalaya

An Institute of National Importance

CURRICULUM

Programme	PhD Electronics and Communication Engineering	Year of Regulation	2018-2019
Department	Electronics and Communication Engineering	Semester	I

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EC 701	Concepts of Electronics and Communication	3	0	0	3	50	50	100	200

Course Objectives	Course Outcomes	CO1		CO2		CO3		CO4	
		Description	Ability	Description	Ability	Description	Ability	Description	Ability
To provide students an understanding of the concepts related to MOSFET modelling.	Course Outcomes	CO1	Able to model MOSFET, its operation, characteristics, circuit models, fabrication process	CO2	Able to gain insights into binary adders, multiplexers, counters, registers, flip-flops and FPGA design flow	CO3	Able to understand the basic signals and systems, transform theory, analog to digital conversion, baseband transmission and information theory basics	CO4	Able to analyse Maxwells theory, wave propagation and types of transmission lines
To develop the skills for modular Boolean, Arithmetic and Sequential circuits									
To familiarize students on the concepts of signals and systems, basics of baseband transmission									
To understand the significance of Maxwell's equations, fundamental concepts of Transmission line and its application as antenna.									

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
1	CO1	2	3	2	1	0	0	0	0	2	0	0	0	3	2	3	0
2	CO2	3	3	2	2	0	0	0	0	2	0	0	0	3	1	2	0
3	CO3	2	2	2	3	2	0	0	0	0	0	0	1	2	2	3	0
4	CO4	1	3	3	0	0	0	0	0	1	0	0	0	2	3	2	0

SYLLABUS

No.	Content	Hours	COs
I	Circuit design, MOSFET modeling, model parameters, interconnects. MOS transistor structure and its operation: Characteristics, scaling theory, hot carrier effects, parasitic elements, MOSFET circuit models, modeling of hot carrier and short channel effects. MOS capacitor with zero and nonzero bias, C-V curves, anomalous C-V curves, non-uniform doped substrate.	08	CO1
II	Binary parallel adder, BCD adder, encoder, decoder, multiplexer and demultiplexer circuits, basic concepts of counters and register, design of counter using state diagrams and tables, sequence generators, register using different types of flip flop, state machines and ASM realization, RTL design, FPGA architecture and design flow.	07	CO2
III	Review of basic signals, systems and signal space: review of 1-D signals and systems, review of random signals, multi-dimensional signals. Signal representation: Transform theory and methods	07	CO3
IV	Review of sampling theorem, practical aspects of sampling and quantization of analog signals, wave from coding and prediction coding; Baseband shaping, binary data formats, NRZ, RZ, Manchester formats, Baseband transmission, Introduction to Information Theory: Information and Sources Uniquely Decodable Codes.	07	CO3
V	Review of Maxwell's equation and wave propagation, need for transmission line theory, examples of transmission lines, equivalent circuit representation. Introduction to microstrip transmission lines.	07	CO4
Total Hours		36	

Essential Readings

1. Proakis J. G. and Manolakis D. G., "Digital Signal Processing: Principles, Algorithms and Applications", 4th Edition, Pearson Education, 2007.
2. Oppenheim A. V. and Shafer R. W., "Discrete-Time Signal Processing", 3rd Edition, PHI, 2013.
3. Mano Morris, "Digital Logic and Computer Design", 1st edition, Pearson Education, 1979
4. Jain R. P. and Anand M. H. S., "Digital Electronics Practices using Integrated Circuits", 1st edition, TMH, 1983
5. Lathi B.P. and Ding Zhu, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2010.
6. Neamen, D. A. & Biswas, D., "Semiconductor Physics & Devices", McGraw-Hill, 4th Edition, 2003.
7. Boylestad Robert L. and Nashlesky Louis, "Electronics Device & Circuits Theory", 10th Edition, PHI, 2009.
8. Hayt, W. H. & Buck, J. A., "Engineering Electromagnetic", 7th Edition, McGrawHill, 2006.
9. Jordan E. C. and Balmain K. G., "Electromagnetic Waves and Radiating Systems", 2nd Edition, Prentice Hall, 2011.