TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

2-Year Master of Technology (M.Tech) Curriculum and Syllabus for Electronics & Communication Engineering (ECE)

First Semester

Sl No	Code	Subject	Contacts			Credits
			L	T	P	
A. Theory						
1	TIU-PMA-T115	Advanced Numerical Methods	3	1	0	4
2	TIU-PCS-T101	Advanced Design and Analysis of Algorithms	3	0	0	3
3	TIU-PEC-T101	Electronic System Design	3	1	0	4
4	TIU-PEC-T103	Advanced Digital Signal Processing	3	1	0	4
5	TIU-PEC-T105	Wireless Communication	3	1	0	4
B. Practical						
1	TIU-PCS-L101	Advanced Design and Analysis of Algorithms Lab	0	0	2	2
2	TIU-PEC-L105	Communication Lab	0	0	3	2
3	TIU-PEC-L103	DSP Lab	0	0	3	2
C. Sessionals						
1	TIU-PES-S199	Entrepreneurship Skill Development	0	0	0	2
Total						27

External Expert	HOD	Registrar	Dean	VC

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Mathematical Methods and Optimization Techniques

TIU-PMA-T115
L-T-P: 3-1-0 **Credits: 4**

Syllabus to be provided by department of Mathematics.

Advanced Design and Analysis of Algorithms
TIU-PCS-T101
L-T-P: 3-0-0 **Credits: 3**

Syllabus to be provided by department of Computer Science and Engineering.

Electronic System Design
TIU-PEC-T101
L-T-P: 3-1-0 **Credits: 4**

Review of Digital electronics concept: MSI and LSI Circuits And Their Applications Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR and AND OR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay. Sequential Machines.
The Concept Of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set / Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock F/F, Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process, Design .
Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Output Decoders, Counters, Shift Registers and Memory.
Multi-Input System Controller Design System Controllers, Design Phases and System Documentation, Defining The System, Timing And Frequency Considerations, Functional, Position and detailed Flow Diagram Development, MDS Diagram, Generation, Synchronizing Two System and choosing Controller, Architecture, State Assignment, Next State Decoders and its Maps, Output Decoders, Clock and Power Supply Requirements, MSI Decoders, Multiplexers In System Controllers, Indirect Addressed Multiplexers Configurations, Programmable System Controllers, ROM, PLA and PAL Based Design.
Asynchronous Finite State Machines Scope, Asynchronous Analysis, Design of Asynchronous Machines, Cycle and Races, Plotting and reading the Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches to Asynchronous Design, Hazards in Circuit Developed by MEV Method, Electromagnetic Interference and Electromagnetic Compatibility Grounding and Shielding of Digital Circuits. Interfacing digital system with different media like fiber cable, co-axial cable etc.

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Recommended Textbooks:
1. W. I. Fletcher, "An Engineering Approach To Digital Design", Prentice Hall
2. Designing With TTL Circuits by Texas Instruments

Advanced Digital Signal Processing
TIU-PEC-T103
L-T-P: 3-1-0 **Credits: 4**

Discrete time signals and systems: Convolution and frequency response. Discrete time Fourier and Z-transforms: Properties, analysis of discrete time systems. The DFT; Definition and properties, circular convolution calculation, FFT and Chirp transform. Relationship between continuous and discrete time systems; sampling time and frequency normalization, discrete time processing of continuous time signals. Difference equation for digital filters: definition and properties. FIR filters, IIR filters. Digital filter design techniques: Impulse invariance. Bilinear transformation, finite difference, window design methods, frequency sampling optimization algorithms. Parametric signal modeling: Auto regressive signal modeling based on linear prediction, pole zero modeling. Time varying auto regressive models. Parametric signal modeling in the presence of noise. applications, spectral analysis. Power spectral analysis using DFT, Maximum entropy spectral estimation (MEM) Multirate signal processing, effects of finite word length, introduction to digital signal processors.

Recommended Textbooks:
1. J. G. Proakis & D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications", Pearson
2. S. K. Mitra, "Digital Signal Processing: A Computer Based Approach", McGraw Hill
3. T. J. Cavicchi, "Digital Signal Processing", John Wiley
4. A. V. Oppenheim & R. W. Schafer, "Discrete Time Signal Processing", Prentice Hall
5. L. R. Rabiner & B. Gold, "Theory and Application of Digital Signal Processing", Prentice Hall
6. P. Ramesh Babu, "Digital Signal Processing", Scitech

Wireless Communications
TIU-PEC-T105
L-T-P: 3-1-0 **Credits: 4**

Overview of current wireless systems and standards; wireless channel models- path loss and shadowing models; statistical fading models; narrowband and wideband fading models; MIMO channels. Diversity in wireless communications - Non-coherent and coherent reception; error probability for uncoded transmission; realization of diversity: time diversity; frequency diversity:

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DSSS and OFDM; receiver diversity: SC, EGC and MRC; transmit diversity: space-time codes; Information theory for wireless communications- Capacity of fading channels: ergodic capacity and outage capacity; high versus low SNR regime; waterfilling algorithm; capacity of MIMO channels; Multiuser wireless communications: multiple access: FDMA, TDMA, CDMA and SDMA schemes; interference management: power control; multiuser diversity, multiuser MIMO systems.

Recommended Textbooks:

1. A. J. Goldsmith, “Wireless Communications”, Cambridge University Press
2. A. F. Molisch, “Wireless Communications”, John Wiley
3. S. Haykin and M. Moher, “Modern Wireless Communications”, Pearson
4. T. S. Rappaport, “Wireless Communications”, Prentice Hall
5. T. Cover and J. Thomas, “Elements of Information Theory”, John Wiley
6. J. G. Proakis, “Digital Communications”, McGraw Hill
7. R. Prasad, “OFDM for Wireless Communication Systems”, Artech House

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