Curriculum for MTech in Communications, Signal Processing and Learning (CSPL)

The following curriculum is to be followed for the 2-year MTech programme and the 3-year MTech (RA) programme in CSPL (**August 2023 onwards**)

Department Core and Soft Skill Courses

Course Number	Course Name	Credits	Semester offered
EE5817	Random Variables and Stochastic Processes	3	odd
EE5609	Matrix Theory	3	odd
EEXXXX	Course from the core basket	3	I,II
SS 5901	Industry Lectures	1	I-IV
LA5180	English Comm	1	odd

Summary

Course type	Credits
Department core	9
Electives (theory + lab)	15
Core (lab)	2
Soft skills	2
Thesis	24
Total	**52**

Students must take a total of 18 credits across baskets, with at least 2 elective credits from each of the elective baskets (signal processing, communications, and learning).

List of core courses (theory)

Course number	Course name	Credits	Course type
EE5817	Random Variables and Stochastic Processes	3	Department Core
EE5609	Matrix Theory	3	Department Core
EEXXXX	Courses from the core basket	3	Department Core

Lab Basket

Lab basket (2 credits) Students can pick any 2 credits of these lab courses, depending on their thesis topic or interest			
Course code	Course name	Credits	Prerequisites
EE5801	Communications lab	1	Digital communication
EE5803	FPGA lab	1	None
EE5802	DSP lab	1	None
EE5911	Next-gen wireless lab	1	Wireless Communication
EE5901	Machine learning lab	1	PRML or equivalent

Elective baskets

Students must take a total of 15 elective credits across baskets, with at least 2 elective credits from each of Communications, Signal Processing and Learning baskets.

Any new course proposed in the future will be placed in one of the baskets.

Core Basket (minimum of 3 credits from this basket)		
Course code	Course name	Credits
EE5606	Convex Optimization	3
EE5903	Information theory, coding and inference	3
EE5603	Concentration Inequalities	1
EE5913	Statistical Inference	3
EE5910	Advanced Stochastic Processes	3

The courses in this basket are foundational for project and research in multiple areas: communications, signal processing and learning. This core basket provides flexibility to students in terms of forming a strong theoretical foundation.

Specialization baskets

Learning basket (min 2 credits from this basket)		
Course code	Course name	Credits
EE5610	Pattern Recognition and Machine Learning	3
EE6380	Deep Learning	3
EE5600	Introduction to Machine Learning	1
EE5601	Representation Learning	1
EE5602	Probabilistic Graphical Models	1
EE5604	Introduction to Statistical Learning Theory	1
EE5605	Kernel Methods	1
EE5611	Machine Learning Applications for Wireless Communications	3
EE5620	Machine Learning for Signal Processing	3
EE5720	Game theory	1
EE5328	Intro to submodular functions	1

Course code	Course name	Credits
EE5901	Machine Learning Lab	1

Signal Processing Basket (min 2 credits from this basket)		
Course code	**Course name**	**Credits**
EE5900	Advanced Digital Signal Processing	3
EE6307	Speech Systems	3
EE5630	Topics in Signal Processing	2
EE5360	Practical Challenges in Image Analysis	3
EE6310	Image and Video Processing	3
EE7350	Adaptive Signal Processing	3
EE5802	DSP lab	1
EE5811	FPGA Lab	1

Communications Basket (min 2 credits from this basket)		
Course code	**Course name**	**Credits**
EE5837	Principles of Digital Communication	3
EE6340	Wireless Communications	3
EE6320	Wireless Sensor Network	3
EE5350	Error Correcting Codes	3
EE7330	Network Information Theory	3
EE5161	Introduction to UAV	2
EE6330	Advanced Cellular Communications	3
EE6350	Multiple Antenna Systems	3
EE6341	Communication Networks	3

EE5848	Topics in Information Theory & Coding	2
EE6367	Topics in data storage and communications	2
EE5801	Communications lab	1
EE5911	Next-gen wireless lab	1

List of thesis courses (2-year MTech)

Course code	Name of course	Number of credits	Semester
EE6715	MTech CSPL Thesis stage - 1	12	3
EE6725	MTech CSPL Thesis stage - 2	12	4

List of thesis courses (3-year MTech)

Course code	Name of course	Number of credits	Semester
EE6815	MTech RA CSPL Thesis stage - 1	1	1
EE6825	MTech RA CSPL Thesis stage - 2	2	2
EE6835	MTech RA CSPL Thesis stage - 3	2	3
EE6845	MTech RA CSPL Thesis stage - 4	4	4
EE6855	MTech RA CSPL Thesis stage - 5	8	5
EE6865	MTech RA CSPL Thesis stage - 6	8	6