INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	**Acoustic and Audio Signal Processing**	Course No		EEE6XXX			
Specialization	Signal Processing & Communication	Structure (LTPC)		3	1	0	4
To be offered for	PG/Ph D	Status		Core ☐		Elective ▪	
Faculty Proposing the course	Dr. Asutosh Kar	Type		New ▪		Modification ☐	
Date of DAC	12-11-2018	Members Present in DAC		All Faculty Members of the Dept. External Members:*			
Pre-requisite	Signal & Systems and Digital Signal Processing	Submitted for approval		39th Senate			
Learning Objectives	- To learn fundamentals of acoustics and audio signal processing - To equip students to design modern audio systems and medical aids incorporating noise control						
Learning Outcomes	- Familiarization with state-of-the-art applications of acoustic signal processing algorithms, audio signal analysis and design of modern audio equipment - Adaptive filter applications in signal processing especially for solving real-time industrial problems.						
Contents of the course *(With approximate break-up of hours)*	Introduction to the course: Course overview with brief background of digital audio signal analysis and representation techniques, random variables and random process, strict sense stationary and wide sense stationary signals, basic statistical signal processing techniques with applications for the acoustic signal analysis , FIR and IIR Filter design, FIR filter applications in audio signal enhancement. (12 Hrs.) Acoustic Signal Processing: Characteristics of widely interfaced acoustic signals, Auto Regressive, Moving Average and Auto-Regressive-Moving-Average statistical models for synthesis and analysis of acoustic signals, multiple sub-filter based DEA, CEA and COEA algorithm applications for acoustic signal enhancement, monophonic and stereophonic acoustic echo cancellation, noise measurement and active acoustic noise reduction, cockpit noise cancellation. (15 Hrs.) Device Development & Applications: Design of basic audio systems, hearing aid system design, feedback cancellation algorithms for modern BTE-hearing aids, variable tap- length filter design for audio devices, convergence and steady-state analysis of audio signal enhancement algorithms, application of machine learning and ANN for audiology and acoustic signal analysis. (15 Hrs.)						
Text Books	1. Jacob Benesty Israel Cohen Jingdong Chen, Fundamentals of Signal Enhancement and Array Signal Processing, Wiley & Sons, 2018 2. Udo Zolzer, Digital Audio Signal Processing, Wiley & Sons, 2008.						
Reference Books	Books: 1. Manolakis, D., Ingle, M., Kogon, S., Statistical and Adaptive Signal Processing, McGraw-Hill, Revised Edition 2014. 2. Simon Haykin, Adaptive Filter Theory, Pearson Education, Fourth Edition, 2002. 3. Gay, Steven L., Benesty, Jacob, Acoustic Signal Processing for Telecommunication, Springer, 2001. Selected Latest Research Papers from: 1) IEEE Transactions of Audio, Speech and Language Processing. 2) Elsevier Applied Acoustic Journal. 3) Elsevier Signal Processing. 4) Springer, Circuits, Systems and Signal Processing.						

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