

Course code	Course Title	L	T	P	C
1154BM101	Brain Computer Interface	2	0	0	2

Prerequisite

None

Links to other courses

Analog Electronics and Integrated Circuits

Course Outcomes

Upon successful completion of the course the students will be able to

S.No	Course outcome	Skill Level (Blooms'sTaxonomy)
CO1	Discuss different types of BCI signals from instruments	K2
CO2	Discuss and compare different types of brain signals used for feature extraction	K2
CO3	Discuss the major components of BCI which makes up the system	K2
CO4	Explain the applications based on BCI	K2
CO5	Use the toolbox BCILAB	K2

COURSE CONTENT

UNIT-I Brain computer interface

6

What is BCI? How do BCI works, Brain computer interface types-Invasive, Partially invasive, Non-invasive, Brain signal for BCI signal-EEG, MEG, fNIRS, fMRI , Non brain signals for BCI

UNIT-II EEG features used in BCI

6

EEG Process, Temporal characteristics, Spatial Characteristics, Oscillatory EEG activity, event-related potentials (ERP), slow cortical potentials (SCP), and neuronal potentials. Motor Imagery BCI

UNIT-III Major components of BCI

6

Signal Processing-Spatial, temporal, spectral, spatio-temporal filters, Feature extraction, Machine Learning

UNIT-IV BCI system

6

BCI monitoring hardware and hardware, BCI application-P300 speller, neuro prosthetic devices

UNIT-V BCI LAB Tool Box

6

Toolbox Architecture, Plug-in concepts, Implementing ERP Based BCI, ERP Analysis in BCI Lab

TOTAL: 30 periods

TEXT BOOKS

1. R. Wolpaw and Elizabeth Winter Wolpaw, “Review of “Brain- Computer Interfaces, principles and practice”, Biomed Engineering online
2. Christian Kothe,”Introduction to Modern Brain Computer Interface design video lectures,
https://sccn.ucsd.edu/wiki/Introduction_To_Modern_BrainComputer_Interface_Design

REFERENCE BOOKS

1. “Brain Computer Principles and Practices”,Jonathan Wolpaw ,Elizabeth Winter Wolpaw, Oxford University Press