

MINUTES OF BOARD OF STUDIES MEETING

Board of Studies (BoS) meeting of B.Tech. Program was conducted on 08-10-2025 in virtual mode from 10.00 am to 11.30 am in blended mode.

All the internal members of VFSTR attended the meeting in person while all the external members participated the meeting virtually with link:

Join: <https://teams.microsoft.com/meet/45883983937543?p=UkONQo1iwVQ4rVMDFM>

Agenda of the BoS Meeting:

1. Discussion and approval of assessment pattern revisions for R22 (C22 & C24) regulations.
2. Approval of the revised syllabus for Probability and Statistics for AI and Machine Learning.
3. Discussed the discontinuation of the M.Tech. program in Power Electronics and Drives and the introduction of a new advanced M.Tech. program in Electric Vehicles.
4. Any other point with the permission of chair.

The following members were present

Sl. No	Name of the Member	Designation and Address	Role
1	Dr. K. Mercy Rosalina	Professor	Chairperson
2	Dr. Jithendranath J.	Senior Project Engineer, Hitachi Energy Technology Services P. Ltd., Grid and Power Quality Solutions, Chennai Mobile: +91-9949537586 Email: jithendranath.j@hitachienergy.com	External Member (Industry)
3	Dr. B. Satish Babu	Sr. Staff Engineer, Infineon Technologies, Bangalore Phone: 9958006750 Email: satishbabu.bhugineni@infineon.com	Invited Member (External-Industry)
4	Dr. Polamraju V. S. Sobhan	Associate Professor & HoD	Internal Member
5	Dr. M. Subba Rao	Associate Professor	Internal Member
6	Dr. A.R. Vijay Babu	Associate Professor	Invited Member

7	Mr. K. Ashok Kumar	Assistant Professor, VFSTR Deemed to be University, Off Campus	Internal Member
8	Dr. K. Chakravarthi	Assistant Professor (BoA), Department of EEE, VFSTR	Member Secretary

In the beginning of the meeting the Chairperson of the BoS, Dr. K. Mercy Rosalina, Professor, department of EEE welcomed all the members and briefed them about the progress of the Department.

The following are the views expressed by the external members:

Dr. Jithendranath J.

- Appreciated the revised assessment pattern for promoting continuous learning, experiential learning, and regular student engagement throughout the semester.
- Suggested strengthening analytical and application-oriented assessment methods through reviews, presentations, simulations, and problem-solving activities aligned with Outcome Based Education (OBE).
- Recommended giving more importance to practical implementation, innovation, and technical presentation skills through IEEE/APA-format reviews and voice-in-built presentations.
- Suggested revising the course Probability and Statistics to include concepts related to AI and Machine Learning, considering the growing importance of AI in engineering.
- Appreciated the department's initiative in introducing the advanced M.Tech. program in Electric Vehicles considering the rapid growth and future demand in EV technologies and sustainable transportation systems.
- Appreciated the decision to replace the existing M.Tech. program in Power Electronics and Drives with a more industry-oriented and emerging specialization in Electric Vehicles.

Dr. B. Satish Babu

- Appreciated the inclusion of multiple review mechanisms and continuous evaluation methods to improve student performance, learning effectiveness, and CO-PO attainment.
- Suggested ensuring uniform implementation of the revised assessment pattern across all sections and courses for maintaining transparency and quality in evaluation.
- Recommended incorporating industry-oriented assignments, mini-projects, and real-time case studies in the assessment process to enhance employability and practical knowledge of students.
- Suggested revising the course Probability and Statistics with more focus on AI and ML applications in Electrical Engineering.
- Appreciated the proposed program for aligning postgraduate education with current industrial requirements in electric mobility, battery technologies, automation, and intelligent transportation systems.
- Appreciated the introduction of the M.Tech. program in Electric Vehicles as a timely step to enhance research opportunities, industry collaboration, and employability of students in emerging EV sectors.

The following resolutions were made after detailed discussion:

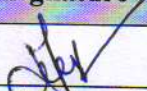
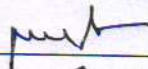

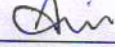

- The proposed assessment pattern revisions R22 regulations were discussed with emphasis on OBE, CO-PO attainment, practical-oriented learning, laboratory evaluation, analytical problem-solving, and uniform implementation aligned with industry requirements in Electrical & Electronics Engineering.
- The Board approved the revised syllabus of Probability and Statistics for AI and Machine Learning to better support AI and ML applications in Electrical Engineering.
- The Board decided to discontinue the existing M.Tech. program in Power Electronics and Drives (PED) and proposed introducing a new advanced M.Tech. program in Electric Vehicles owing to current Industrial trends.

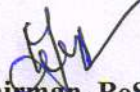
The Chair rendered the closing remarks by thanking all the external members and internal members for their participation.


Member Secretary


Chairperson

The following are the members present for the board of studies meeting held at Department of Electrical and Electronics Engineering on 08.10.2025

Sl. No	Name of the Member	Designation and Address	Signature
1	Dr. K. Mercy Rosalina	Professor	
2	Dr. Jithendranath J.	Senior Project Engineer, Hitachi Energy Technology Services P. Ltd., Grid and Power Quality Solutions, Chennai Mobile: +91-9949537586 Email: jithendranath.j@hitachienergy.com	Participated the Meeting Virtually
3	Dr. B. Satish Babu	Sr. Staff Engineer, Infineon Technologies, Bangalore Phone: 9958006750 Email: satishbabu.bhogineni@infineon.com	Participated the Meeting Virtually
4	Dr. Polamraju V. S. Sobhan	Associate Professor & HoD	
5	Dr. M.SubbaRao	Associate Professor	
6	Dr. A. R. Vijay Babu	Associate Professor	
7	Mr. P. Ashok Kumar	Assistant Professor, VFSTR Deemed to be University, Off Campus	Participated the Meeting Virtually
8	Dr. K. Chakravarthi	Assistant Professor (BoA), Department of EEE, VFSTR	


Chairman, BoS

PROBABILITY AND STATISTICS FOR AI AND MACHINE LEARNING

Hours per week:

L	T	P	SL	C
2	2	0	2	3

PREREQUISITE KNOWLEDGE: Basic Algebra, Calculus and Set Theory.

COURSE DESCRIPTION AND OBJECTIVES:

This course covers probability and statistics as the foundation for AI and Machine Learning, with applications relevant to Electrical Engineering. Topics include random variables, distributions, sampling, inference, regression, and basic ML concepts like Naïve Bayes.

Course Objectives

- Understand uncertainty and apply probability to data-driven problems.
- Analyze data using statistical methods and inference.
- Connect probabilistic thinking to foundational ML algorithms.

MODULE-I

18L+12T+0P+18SL=48 Hours

UNIT-I

FOUNDATIONS OF DATA AND PROBABILITY FOR AI

Human learning vs. machine learning (conceptual), Types of ML: supervised, unsupervised, reinforcement, Data types: numerical, categorical, structured, unstructured, Measures of central tendency: mean, median, mode, Data spread: range, variance, standard deviation, quartiles
Random experiments, sample space, events, Axioms of probability, Conditional probability and independence, Bayes' theorem (intuitive and computational), Basic combinatorics for ML (counting principles)

UNIT-II

RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS

Random variables: discrete and continuous, Probability Mass Function (PMF) and Probability Density Function (PDF), Joint, marginal, and conditional distributions
Expectation, variance, and standard deviation, Covariance and correlation
Important distributions: Bernoulli, Binomial, Poisson, Uniform and Normal (Gaussian) distributions, Central Limit Theorem, Chebyshev's inequality and Law of Large Numbers

PRACTICES:

- Compute mean, median, mode, variance, and standard deviation of voltage sensor readings from a power substation to identify abnormal fluctuations. | Excel / Python (NumPy) |
- Create histograms and bar charts of motor current measurements collected over different load cycles to visualize operational patterns. | Excel / Matplotlib |
- Apply Bayes' theorem to determine the probability of a circuit fault given a sensor alarm, considering false positive and false negative rates. | Manual / Python |
- Generate and plot PDF of normal distribution to model thermal noise in a resistor and PMF of Poisson distribution for radio-active decay events in a sensor. | Python (SciPy, Matplotlib) |
- Compute the mean and variance of arrival times of data packets in a communication network using simulated Poisson distribution. | Python / Excel |
- Calculate covariance and correlation coefficient between ambient temperature and solar panel power output to assess environmental impact on energy generation. | Python (pandas) / Excel |

MODULE-II

27L+18T+0P+27SL=72 Hours

UNIT-I

DESCRIPTIVE STATISTICS AND DATA VISUALIZATION

Frequency and relative frequency distributions, Graphical methods: histograms, frequency polygons, box plots. Measures of dispersion: range, IQR, variance, standard deviation, Skewness and kurtosis (conceptual), Percentiles, z-scores, and data interpretation.

Introduction to data visualization using Python (Matplotlib) or Excel, Detecting outliers and data anomalies

UNIT-II

SAMPLING THEORY

Population vs. sample, Sampling techniques: random, stratified, systematic, Sampling distributions: mean, proportion, variance, Chi-square, t, and F distributions (conceptual)

UNIT-III

REGRESSION, CORRELATION, AND ML APPLICATIONS

Curve fitting: linear and nonlinear, Method of least squares, Simple linear regression, Multiple regression, Correlation: Pearson and rank correlation, Standard error of estimate.

Role of probability in ML models, Introduction to classification, Naïve Bayes classifier, **Vaisheshika Philosophy** (Classification and categorization of entities align with **data classification in machine learning**)

PRACTICES:

- Construct frequency distribution tables for hourly energy consumption data from a smart meter to identify peak usage intervals. | Excel / Python (pandas) |
- Visualize a real dataset of wind turbine power output across seasons using multiple plots and summarize daily generation patterns. | Python (Matplotlib, Seaborn) |
- Draw random and stratified samples from a large dataset of electricity bills to estimate average household consumption without analyzing all records. | Python (random. sample, pandas) |
- Construct the sampling distribution of sample mean voltage from a power grid and compare with theoretical normal distribution to validate sampling accuracy. | Python simulation |
- Fit a simple linear regression model to predict power consumption based on ambient temperature using least squares method and plot the regression line. | Python (scikit-learn) / Excel |
- Compute Pearson correlation between rotor speed and vibration amplitude in a motor, and Spearman rank correlation for non-linear relationship detection. | Python (scipy.stats) |
- Calculate R-squared and standard error of estimate for a regression model that estimates battery state-of-charge from voltage and current measurements. | Python / Excel |
- Apply Naïve Bayes classifier to distinguish between normal and faulty operation of an induction motor using vibration and temperature sensor data. | Python (scikit-learn: GaussianNB) |

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to

CO No.	Course Outcomes	Bloom's Level	Mapping with POs
1	Apply basic probability axioms and Bayes' theorem to quantify uncertainty in AI/ML problems.	Apply	1, 2, 5

2	Model real-world data using appropriate discrete and continuous random variables and distributions.	Apply	1, 2, 4
3	Visualize and summarize datasets using statistical measures and graphical tools.	Analyze	4, 5
4	Apply basic statistical inference (estimation) to support engineering decisions.	Apply	1, 2, 6
5	Relate regression, correlation, and probabilistic reasoning to foundational ML algorithms such as Naïve Bayes.	Analyze	1, 2, 5, 12

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS):



TEXT BOOKS:


1. I.R. Miller, J.E. Freund and R. Johnson, "Probability and Statistics for Engineers", 9th Edition, Pearson, 2018.
2. John Schiller, R. Alu Srinivasan, Murray Spiegel, "Schaum's Outline of Probability and Statistics" 3rd Edition, The McGraw-Hill Companies Inc, 2009.

REFERENCE BOOKS:

1. Anirban Das Gupta, "Probability for Statistics and Machine Learning: Fundamentals and Advanced Topics", Springer, 2011.
2. Himanshu Singh, Statistics for Machine Learning, BPB publications, 2021.
3. S. C. Gupta and V. K. Kapoor, "Fundamentals of Applied Statistics", Sultan Chand & Sons, 4th edition, 2007.

SKILLS:

- ✓ Proficiency in probability axioms, conditional probability, and Bayes' theorem for reasoning under uncertainty in electrical systems.
- ✓ Ability to model random phenomena using discrete and continuous probability distributions for signal noise, component failures, and load variations.
- ✓ Understanding of expectation, variance, covariance, and correlation for analyzing relationships between electrical parameters like voltage, current, and temperature.
- ✓ Application of descriptive statistics and data visualization techniques to interpret sensor data, power quality measurements, and equipment performance.
- ✓ Ability to apply regression and correlation methods to model and predict system behavior, such as energy consumption and equipment degradation.
- ✓ Developing probabilistic thinking to implement foundational machine learning algorithms like Naïve Bayes for fault detection and classification in electrical engineering problems


 Chairman, BoS