

DSM362 Deep Learning

Semester: VI	Course Title: Deep Learning	Credit: 4
Course Code: DSM362		(3 T + 1 P)

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO1	REMEMBERING	Recall foundational concepts in predictive modeling and evaluation.
CO2	UNDERSTANDING	Explain predictive tasks, modeling workflows, and challenges like class imbalance.
CO3	APPLYING	Apply various predictive algorithms to real-world datasets using Python.
CO4	ANALYSING	Analyze model performance using validation methods and interpretability tools.
CO5	EVALUATING	Evaluate and compare predictive models using appropriate metrics.
CO 6	CREATING	Build and tune end-to-end predictive modeling pipelines with Python.

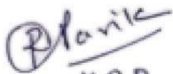
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	2	2
CO 2	3	3	2	2	2
CO 3	2	3	3	3	2
CO 4	3	3	3	3	3
CO 5	3	3	3	3	2
CO 6	3	3	3	3	3

Unit No.	Detailed Syllabus	Teaching Hours
I	Foundations of Predictive Modeling Predictive Modeling: Definition, Use Cases, Supervised Learning tasks: Classification vs Regression, Evaluation Metrics: MAE, RMSE, R ² , Accuracy, Precision, Recall, F1-Score, Cross-validation techniques (k-fold, stratified), Business applications and challenges in predictive modeling	15
II	Advanced Algorithms & Regularization Regularized Regression: Ridge, Lasso, ElasticNet, Ensemble Models: Gradient Boosting (XGBoost, LightGBM), Model Stacking and Blending Handling class imbalance: SMOTE, Under-sampling, Over-sampling Model Interpretability: SHAP values, LIME Feature importance	15
III	Model Tuning, Validation, and Ethics Bias-Variance Tradeoff, Hyperparameter tuning: Grid Search, Random Search, Cross-validation for model selection, Model deployment basics:	15

	Saving/loading with joblib, Ethical Considerations: Fairness, bias in prediction, data leakage	
IV	Practical Applications • Implementation using Python (Scikit-learn, XGBoost, LIME) • Complete pipeline: preprocessing → modeling → tuning → evaluation → interpretation • Mini Projects: • Churn prediction • Loan default prediction • Email spam detection • End-to-end predictive modeling on structured datasets	15

Suggested Reference Books:

1. Hands-On Predictive Analytics with Python – Alvaro Fuentes
2. Applied Predictive Modeling – Max Kuhn
3. Interpretable Machine Learning – Christoph Molnar
4. Feature Engineering for Machine Learning – Alice Zheng
5. Python Machine Learning – Sebastian Raschka


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