

Year: B. Tech IV (Semester VII)

Subject Name: Recommendation Systems
Type of course: Professional Elective Course
Prerequisite (if any): -

Subject Code: BTAI14703

Rationale: The course will cover fundamental aspects of Recommender systems, focusing on theory as well as on the practical use and applications of Recommender systems. Recommender systems are around us and are encountered on multiple domains such as e-commerce, content and media distribution, social media and so on. The course aims to explain both basics and advanced topics and concepts for recommender systems.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	0	3	60	25	15	0	0	100

CA1: Continuous Assessment (assignments / projects / open book tests / closed book tests) CA2: Sincerity in attending classes / class tests / timely submissions of assignments / self-learning attitude / solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work / Quality of work submitted / Active participation in lab sessions / viva on practical skills learned in course.

Contents:

Sr. No.	Contents	Total Hours
1.	Introduction to Recommender System Introduction, Goals of Recommender Systems, Basic Models of Recommender Systems, Domain-Specific Challenges in Recommender Systems, Application Domains	04
2.	Collaborative Filtering User-based collaborative filtering, Item-based collaborative filtering, Key Properties of Ratings Matrices, Predicting Ratings with Neighborhood-Based Methods, User-Based Neighborhood Models, Similarity Function Variants, Variants of the Prediction Function, Strengths and Weaknesses of Neighborhood-Based Methods, Clustering and Neighborhood-Based Methods, Dimensionality Reduction, User-Based Nearest Neighbor Regression, Item-Based Nearest Neighbor Regression, Combining User-Based and Item-Based Methods, Graph Models for Neighborhood-Based Methods,	15

	Decision and Regression Trees, Rule-Based Collaborative Filtering, Naïve Bayes Collaborative Filtering, Using an Arbitrary Classification Model as a Black-Box, Using an Arbitrary Classification Model as a Black-Box, Matrix Factorization, Singular Value Decomposition, Out-of-Sample Recommendations	
3.	Content-Based Recommender Systems Basic Components, Pre-processing and Feature Extraction, Feature Representation and Cleaning, Collecting User Likes and Dislikes, Supervised Feature Selection and Weighting, Learning User Profiles and Filtering, Nearest Neighbor Classification, Bayes Classifier, Rule-based Classifiers, Content-Based Versus Collaborative Recommendations	08
4.	Knowledge-Based Recommender Systems Constraint-Based Recommender Systems, Case-Based Recommenders, Similarity Metrics, Critiquing Methods, Persistent Personalization in Knowledge-Based Systems	05
5.	Evaluating Recommender Systems Evaluation Paradigms, General Goals of Evaluation Design, Accuracy, Coverage, Confidence and Trust, Novelty, Diversity, Robustness and Stability, Scalability	04
6.	Advanced Topics in Recommender Systems Ensemble-Based and Hybrid Recommender Systems, Time-and Location-Sensitive Recommender Systems, Sequential Pattern Mining, Location-Aware Recommender Systems, Multi-Armed Bandit Algorithms, Group Recommender Systems, Multi-Criteria Recommender Systems, Active Learning in Recommender Systems, Privacy in Recommender Systems	09

Suggested Specification table with Marks (Theory): (For B. Tech only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	30	10	5	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (Revised Bloom’s Taxonomy)

Reference Books:

Sr no	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Recommender Systems: The Textbook	Charu C. Aggarwal	Springer ISBN978-3-319-29657-9	2016	-
2.	Recommender Systems Handbook	Francesco Ricci, Lior Rokach, Bracha Shapira, Paul Kantor	Springer ISBN978-0-387-85819-7	2011	3 rd Edition
3.	Recommender Systems for Learning	Nikos Manouselis, Hendrik Drachsler, Katrien Verbert, Erik Duval	Springer ISBN978-1-461-44361-2	2012	-

Course Outcomes (CO):

Sr. No.	CO statements	Marks % weightage
CO-1	Describe basic concepts behind recommender system	15%
CO-2	Analyze a variety of approaches for building recommender systems.	50%
CO-3	Interpret the system evaluation methods from multiple perspectives	15%
CO-4	Learn about advanced topics and current applications of recommender systems	20%