**Lecture Plan**

**Recommender System**

##### Before MST 1: 50% Syllabus should be covered Before MST 2: Another 50% Syllabus should be Covered

**Include tutorials, Class test, surprise test, Content Beyond Syllabus etc…**

**Detailed Contents:**

**Module 1: Introduction**

Introduction and basic taxonomy of recommender systems (RSs). Traditional and non-personalized RSs. Overview of data mining methods for recommender systems (similarity measures, classification, Bayes classifiers, ensembles of classifiers, clustering, SVMs, dimensionality reduction). Overview of convex and linear optimization principles

[3 hrs] (CO1)

**Module 2: Content-based recommender systems**

The long-tail principle. Domain-specific challenges in recommender systems. Content-based recommender systems. Advantages and drawbacks. Basic component’s of content-based RSs. Feature selection. Item representation Methods for learning user profiles

[3 hrs] (CO1, CO2)

**Module 3: Collaborative Filtering (CF)-based RSs**

Mathematical optimization in CF RSs. Optimization objective. Baseline predictor through least squares. Regularization and overfitting. Temporal models. Step-by-step solution of the RS problem, Nearest-neighbor collaborative filtering (CF). User-based and item-based CF, comparison. Components of neighborhood methods (rating normalization, similarity weight computation, neighborhood selection). Hybrid recommender systems.

[6 hrs] (CO3, CO4)

**Module 4: Context awareness and Learning principles in RSs**

Context-aware recommender systems. Contextual information models for RSs. Incorporating context in Rs. Learning to rank. Active learning in RSs. Multi-armed bandits and Reinforcement learning in RSs. Dynamic RSs.

[6 hrs] (CO4)

**Module 5: User behaviour understanding in RSs**

Foundations of behavioral science. User choice and decisions models. Choice models in RSs. Digital nudging and user choice engineering principles. Applications and examples for recommender systems.

[3 hrs] (CO4)

**Module 6: Applications of RSs for content media, social media and communities**

Music and video RSs. Datasets. Group recommender systems. Social recommendations. Recommending friends: link prediction models. Similarities and differences of RSs with task assignment in mobile crowd sensing. Social network diffusion awareness in RSs.

[6 hrs] (CO5)

**Signature of HOD Signature of Subject Coordinator**

**Lecture Plan**

**Recommender System Lab**

**Experiment list**

**Part 1. Getting ready for recommender systems**

1. What is a recommender?
2. Taxonomy of recommender systems.
3. Machine learning and the Netflix Prize.
4. The MovieGEEKs website.
5. Building a recommender system.
6. User behaviour and how to collect it.
7. Monitoring the system.
8. Ratings and how to calculate them.
9. Non-personalized recommendations
10. The user (and content) who came in from the cold

**Part 2. Recommender Algorithms**

1. Findings similarities among users and among content.
2. Collaborative filtering in the neighborhood.
3. Evaluating and testing your recommender.
4. Content- based filtering.
5. Finding hidden genres with matrix factorization.
6. Taking the best of all algorithms: Implementing hybrid recommendations.
7. Ranking and learning to rank.
8. Future of recommender system.

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**Course outcomes**

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| **Sr no** | **Course Outcomes** |
| 1 | Understand the fundamentals of recommender systems, including their taxonomy, challenges, and applications. |
| 2 | Analyze various recommendation techniques, such as content-based filtering, collaborative filtering, and hybrid approaches. |
| 3 | Apply data mining techniques to extract meaningful insights from user data and item information. |
| 4 | Design and implement effective recommender systems, considering factors like user preferences, item characteristics, and contextual information. |
| 5 | Evaluate the performance of recommender systems using appropriate metrics and techniques. |