Faculty of Engineering and Technology
B Tech (CS&E) Programme
Semester VI

Recommender Systems Laboratory

Course Code: 2603632 **Course Credit: 4**

Program Objectives (PO):

PO 1: The graduate will be able to apply the knowledge of mathematics, basic science, engineering fundamentals to solve the engineering problems.

PO 2 : The graduate will be able Identify, formulate and solve computer or IT related problems using acquired knowledge.

PO 3 : The graduate will be able to design software solutions or hardware components as per given specifications.

PO 4 : The graduate will be able to analyse, interpret, conduct investigations using engineering knowledge and provide valid conclusions.

PO 5 : The graduate will be able to use and demonstrate the use of the modern tools and technologies related to the latest trends in the computer industry.

PO 6 : The graduate will be able to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7 : The graduate will be able to understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8 : The graduate will be able to apply ethical principles and commit to professional ethics and responsibilities.

PO 9 : The graduate will be able to function effectively as an individual, as a member or as a leader in a team.

PO 10 : The graduate will demonstrate competent Communication skills with respect to verbal communication and technical writing like effective reports, documentation and presentations.

PO 11 : The graduate will be able to demonstrate knowledge of Engineering and management principles and will be able to apply to manage projects in multidisciplinary environments.

PO 12 : The Graduates will be able to recognize the need for, and will have the ability to engage in self learning as per real world requirements.

➢ Introduction

Recommender systems play a crucial role in today's digital world, driving personalized experiences on platforms like e-commerce sites, streaming services, and social media. This course covers the key concepts and methods used in recommender systems, including collaborative filtering, content-based filtering, and hybrid techniques. Students will learn about the algorithms and data structures necessary for creating effective recommendation engines, understand how to evaluate their performance, and gain practical experience through hands-on projects. By the end of the course, participants will have the skills to design, implement, and optimize recommender systems, improving user engagement and satisfaction in real-world scenarios.

➢ Course Objectives:

1. Students will grasp the fundamental principles and techniques of recommender systems, including collaborative filtering, content-based filtering, and hybrid methods.
2. Learners will gain practical experience in designing, implementing, and evaluating recommender systems using relevant algorithms and data structures.
3. Participants will learn to enhance user engagement and satisfaction by applying best practices and optimization techniques to real-world recommender system applications.

➢ Course Duration: The course duration is 40 sessions of 60 minutes each.

➢ Course Content:

Module No.	Modules/Sub-Modules	No. of Sessions	Marks Weightage (%)
I	Study Practicals based on Recommender system, Domain Specific challenges in Recommender Systems, Applications of recommendation systems.	**08**	**20%**
II	Practicals based on Neighborhood-Based Collaborative Filtering: Predicting ratings, User-based neighborhood models, Item-based neighborhood models, Clustering, User-based Nearest neighbor Regression, Item-based Nearest neighbor Regression, Rule based Collaborative filtering, Naive Bayes Collaborative Filtering	**08**	**20 %**
III	Practicals based on Content-based recommender systems: Pre-processing and Feature Extraction, Feature representation and Cleaning, nearest neighbor classification, Bayes classifier, Rule based classifier	**08**	**20 %**

IV	Practicals based on Knowledge based recommendation: Constraint based recommenders, Case based recommenders, Persistent Personalization	**08**	**20 %**
V	Practicals based on Evaluating Recommender System: Introduction, Evaluation Paradigms, General goals of Evaluation designs, Design issues in Offline Recommender Evaluation.	**08**	**20 %**

➢ Course Outcomes

At the end of the course the students should be able to:

CO 1: Understand basic concepts and techniques in the field of recommender systems.

CO 2: Understand and implement models related to collaborative filtering and clustering.

CO 3: Design and implement various methods in content based recommender systems.

CO 4: Design and implement knowledge based recommendation systems and Hybrid systems

CO 5: Evaluate recommender systems based on various evaluation paradigms.

➢ Teaching Scheme

Teaching Scheme (Hours) : 40		
Course Credit: 2		
Theory	Tutorial	Practical
-	-	40

➢ Examination Scheme

Examination Scheme						
		CEC				
External	Internal	Assignment	Quiz	Group Projects	Presentation/ Attendance	Total Marks
50	20	10	10	-	10	100

➢ Teaching Methods:

The following pedagogical tools will be used to teach this course:

1. Demonstration
2. Discussions
3. Practical Task
4. Presentations
5. Case Analysis

➢ Supplementary Readings:

1. Rounak Banik, Hands-On Recommendation Systems with Python: Start building powerful and personalized recommendation engines with Python, Packt publication (2018), 1st edition.
2. C.C. Aggarwal, Recommender Systems: The Textbook, Springer,(2016) 1st Edition.
3. Jannach D., Zanker M. and FelFering A., Recommender Systems: An Introduction, Cambridge University Press(2011), 1st ed.

➢ List of Journals / Periodicals / Magazines / Newspapers/ etc.:

The students will have to refer to past issues of the following links in order to get relevant information pertaining to the subject.

1. https://nptel.ac.in/courses/110107095
2. https://nptel.ac.in/courses/110107092
3. https://nptel.ac.in/courses/106105174

➢ Session Plan:

Session	Topics
1	Study Practicals based on Recommender system,
2	Study Practicals based on Recommender system,
3	Study Practicals based on Recommender system,
4	Study Practicals based on Recommender system,
5	Domain Specific challenges in Recommender Systems,
6	Domain Specific challenges in Recommender Systems,
7	Applications of recommendation systems.
8	Applications of recommendation systems.
9	Practicals based on Neighborhood-Based Collaborative Filtering
10	Predicting ratings,
11	User-based neighborhood models,
12	Item-based neighborhood models,
13	Clustering, User-based Nearest neighbor Regression,
14	Item-based Nearest neighbor Regression,
15	Rule based Collaborative filtering,
16	Naive Bayes Collaborative Filtering
17	Practicals based on Content-based recommender systems
18	Pre-processing and Feature Extraction,
19	Pre-processing and Feature Extraction,
20	Feature representation and Cleaning,
21	Feature representation and Cleaning,
22	nearest neighbor classification,
23	Bayes classifier,
24	Rule based classifier
25	Practicals based on Knowledge based recommendation

26	Practicals based on Knowledge based recommendation
27	Constraint based recommenders,
28	Constraint based recommenders,
29	Case based recommenders,
30	Case based recommenders,
31	Persistent Personalization
32	Persistent Personalization
33	Practicals based on Evaluating Recommender System
34	Practicals based on Evaluating Recommender System
35	Introduction, Evaluation Paradigms,
36	Introduction, Evaluation Paradigms,
37	General goals of Evaluation designs,
38	General goals of Evaluation designs,
39	Design issues in Offline Recommender Evaluation.
40	Design issues in Offline Recommender Evaluation.

➢ Suggested theory Distribution

The suggested distribution as per Bloom's taxonomy is as follows.

Distribution for Course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
20%	20%	30%	20%	10%	-

➢ Instructional Method:

1. The course delivery method will depend upon the requirement of content and the needs of students. .
2. The internal evaluation will be done on the basis of a practical exam and a continuous evaluation of students.
3. Students will use supplementary resources such as online videos, NPTEL videos, E courses.