



National Computing Education Accreditation Council

NCEAC



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COURSE DESCRIPTION FORM

INSTITUTION National University of Computer and Emerging Sciences (NUCES-FAST)

PROGRAM (S) TO BE EVALUATED BS (CS)

A. Course Description

Course Code	CS-4053
Course Title	Recommender Systems
Credit Hours	3+0
Prerequisites by Course(s) and Topics	-
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	Midterm I: 15 marks Midterm II: 15 marks Course Project: 10 marks Assignments: 10 marks Finals: 50 marks
Course Coordinator	Syed Zain Ul Hassan
URL (if any)	-
Current Catalog Description	-
Textbook (or Laboratory Manual for Laboratory Courses)	<i>Recommender systems handbook</i> , by F. Ricci, L. Rokach, B. Shapira and P.B. Kantor, (Springer)
Reference Material	To be provided in the form of slides and tutorials. Resources link: TBA

Course Goals	A. Course Learning Outcomes (CLOs)		
	1. <i>Describe different techniques in making automatic personalized recommendations in various scenarios</i> [Bloom's Taxonomy Level: 3, Learning Domain: Cognitive]		
	2. <i>Solve mathematical optimization problems pertaining to recommender systems</i> [Bloom's Taxonomy Level: 3, Learning Domain: Cognitive]		
	3. <i>Discuss how a recommender system should be evaluated in terms of the system's performance and the user's satisfaction with the system</i> [Bloom's Taxonomy Level: 6, Learning Domain: Cognitive]		
	4. <i>Learn about advanced topics and current applications of recommender systems in realms like social networks and communities</i> [Bloom's Taxonomy Level: 6, Learning Domain: Cognitive]		
	B. Program Learning Outcomes		
1. Computing Knowledge	Apply knowledge of mathematics, natural sciences, computing fundamentals, and a computing specialization to the solution of complex computing problems.	CLO-1	
2. Problem Analysis	Identify, formulate, research literature, and analyze complex computing problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and computing sciences.	CLO-2	
3.Design/Develop Solutions	Design solutions for complex computing problems and design systems, components, and processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	CLO-3	
4. Investigation & Experimentation	Conduct investigation of complex computing problems using research based knowledge and research based methods	CLO-4	

C. Relation between CLOs and PLOs (CLO: Course Learning Outcome, PLOs: Program Learning Outcomes)													
		PLOs											
		1	2	3	4	5	6	7	8	9	10	11	12
C L O s	1	✓											
	2		✓										
	3			✓									
	4				✓								

1. Topics to be covered:			
List of Topics	No. of Weeks	Contact Hours	CLO
Introduction to Recommender System (RS), goals, applications and taxonomy of RS techniques	1	3	1
Recommendations using Collaborative Filtering, types of ranking, cold start problem and serendipity	1	3	1
Neighborhood based methods, similarity measures	1	3	1
Long-tail principle and curse of dimensionality	1	3	2
Rule-based and Naïve Bayes CF	1	3	1
Mid-term I			
Introduction and basic components of Content-based recommendation system	1	4	1
Content-based Filtering	2	6	2
Content-based vs CF recommendations	1	3	1
Mid-term II			
Knowledge-based recommendations, Constraint-based and case-based recommendation system	1	3	1
Matrix Factorization	1	3	3
Neural Recommender Systems	1	2	4
Transformers	1	3	3

	Generative Recommendations	1	3	4
	Evaluation measures for recommendation systems and performance issues	1	3	3
	Final Exam			
	Total	15	45	
Laboratory Projects/Experiments Done in the Course	<p>The lab work to be done in the course include hands-on exercises for the following topics:</p> <ul style="list-style-type: none"> ▪ Simple CF Recommender System for products recommendation ▪ Feature selection ▪ Social media recommendation <p>One group project will be submitted by the students in the penultimate week of the semester.</p>			
Programming Assignments Done in the Course	Assignments related to collaborative filtering, similarity measures, knowledge-based recommendations and evaluation techniques			
Class Time Spent on (in credit hours)	Theory	Problem Analysis	Solution Design	Social and Ethical Issues
	15	15	13	0
Oral and Written Communications	A project report detailing the problem, tools, methods used in the course project to be submitted by every student.			

Instructor Name: Syed Zain Ul Hassan

Instructor Signature: _____

Dated: 31st July 2023