**COURSE DESCRIPTION FORM**

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

**PROGRAM (S) TO BE EVALUATED** BS (CS)

1. **Course Description**

| **Course Code** | CS4053 | | | |
| --- | --- | --- | --- | --- |
| **Course Title** | Recommender System | | | |
| **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) | *Recommender systems handbook*, 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. *Describe different techniques in making automatic personalized recommendations in various scenarios* **[Bloom's Taxonomy Level:** 3**, Learning Domain:** Cognitive**]** 2. *Solve mathematical optimization problems pertaining to recommender systems*  **[Bloom's Taxonomy Level:** 3**, Learning Domain:** Cognitive**]** 3. *Discuss how a recommender system should be evaluated in terms of the system's performance and the user's satisfaction with the system* **[Bloom's Taxonomy Level:** 6**, Learning Domain:** Cognitive&Psychomotor**]** 4. *Learn about advanced topics and current applications of recommender systems in realms like social networks and communities* **[Bloom's Taxonomy Level:** 6**, Learning Domain:** Cognitive&Psychomotor**]** | | | **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** | | | **CLOs** | 1 | **✓** |  |  |  |  |  |  |  |  |  |  |  | | | 2 |  | **✓** |  |  |  |  |  |  |  |  |  |  | | | 3 |  |  | **✓** |  |  |  |  |  |  |  |  |  | | | 4 |  |  |  | **✓** |  |  |  |  |  |  |  |  | | | |  | | | | |
| **Topics Covered in the Course, with Number of Lectures on Each Topic** (assume 15-week instruction and one-hour lectures) | | **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 | **2** | **6** | **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** | | Feature selection and refinement, revisiting curse of dimensionality | **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** | | Evaluation measures for recommendation systems and performance issues | **1** | **3** | **3** | | Recommender system application in social media and communities | **1** | **3** | **4** | | Context-aware RS, introduction to factorization, Neural Networks and reinforcement learning | **1** | **3** | **4** | | **Final Exam** | | | | | **Total** | **14** | **43** |  | | | | |
| **Laboratory Projects/Experiments Done in the Course** | The lab work to be done in the course include hands-on exercises for the following topics:   * Simple CF Recommender System for products recommendation * Feature selection * Social media recommendation   One group project will be submitted by the students in the penultimate week of the semester. | | | |
| **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:** 24th January 2023