| Title (Units): | **COMP7240 Recommender Systems (3,2,1)** |
|---|---|

| Course Aims: | In the current age of information overload, recommender systems offer personalized access for users to efficiently search for information and make choices online. This course introduces recommender systems' major concepts, methodologies, evaluation design, and user experiences. A variety of real-world applications are included, such as those deployed in e-commerce sites and social media. |
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| Prerequisite: | Postgraduate Student Standing |
|---|---|

**Course Intended Learning Outcomes (CILOs):**
Upon successful completion of this course, students should be able to:

| No. | Course Intended Learning Outcomes (CILOs) |
|---|---|
| | **Knowledge** |
| 1 | Describe the basic concepts behind recommender systems |
| 2 | Explain a variety of approaches for building recommender systems |
| 3 | Describe system evaluation methods from both algorithmic and users' perspectives |
| 4 | Describe applications of recommender systems in various domains |
| | **Professional Skill** |
| 5 | Reproduce recommender algorithms using an open-source toolkit |
| 6 | Conduct experimental evaluations on implemented algorithms |

| Calendar Description: | The topics of this course mainly include 1) basic concepts such as user preference and prediction; 2) a variety of typical recommendation approaches including collaborative filtering, content-based filtering, matrix factorization, and neural-network-based approaches; 3) system evaluation design and metrics; 4) the role of human factors in system implementation and user-centered evaluation; 5) popular applications in e-commerce sites and social media. |
|---|---|

**Teaching and Learning Activities (TLAs):**

| CILOs | Type of TLA |
|---|---|
| 1-4 | Students will learn major concepts of and techniques for building and evaluating recommender systems. |
| 5-6 | Students will gain practical experiences via laboratory sessions and assignments. |

**Assessment:**

| No. | Assessment Methods | Weighting | CILOs to be addressed | Description of Assessment Tasks |
|---|---|---|---|---|
| 1 | Continuous Assessment | 50% | 1-6 | Continuous assignments are designed to measure how well students have learned the fundamentals of recommender system implementation and evaluation. Assignments and lab exercises are designed to evaluate students' knowledge and skills. |
| 2 | Examination | 50% | 1-4 | Final examination questions are designed to identify how far students have achieved intended learning outcomes. Questions will primarily assess students' knowledge of recommender systems. |

**Assessment Rubrics:**

| Excellent (A) | • Achieve the six CILOs, demonstrating a mastery of the fundamentals of recommender system implementation and evaluation<br>• Have a thorough understanding of concepts and technologies involved, and be able to explain and highlight the key points of these concepts and technologies<br>• Able to reproduce recommender algorithms and conduct experiments |
|---|---|

| Good (B) | • Achieve the six CILOs, demonstrating a good understanding of the fundamentals of recommender system implementation and evaluation <br>• Have a good understanding of concepts and technologies involved, and be able to explain and highlight the key points of these concepts and technologies <br>• Able to reproduce recommender algorithms and conduct experiments for familiar cases |
|---|---|
| Satisfactory (C) | • Achieve most of CILOs, demonstrating a basic level of understanding of the fundamentals of recommender system implementation and evaluation <br>• Have a basic understanding of the concepts and technologies involved <br>• Able to reproduce recommender algorithms and conduct experiments for simple cases |
| Fail (F) | • Achieve less than three of CILOs, having little understanding of the fundamentals of recommender system implementation and evaluation <br>• Have little understanding of concepts and technologies involved, and are unable to explain and highlight the key points of these concepts and technologies <br>• Unable to reproduce recommender algorithms and conduct experiments for simple cases |

**Course Content and CILOs Mapping:**

| Content | | CILO No. |
|---|---|---|
| I | Basic concepts of recommender systems | 1 |
| II | Recommendation algorithms | 2,5 |
| III | Algorithm evaluation and metrics | 3,6 |
| IV | User experiences | 3,6 |
| V | Applications | 4 |

**References:**
- Francesco Ricci, Lior Rokach, and Bracha Shapira, eds. Recommender Systems Handbook, 3rd edition. Spring US, 2022.
- Dietmar Jannach, Markus Zanker, Alexander Felfernig, and Gerhard Friedrich. Recommender Systems: An Introduction (1st ed.), Cambridge University Press, 2010.
- Michael D. Ekstrand, John T. Riedl, and Joseph A. Konstan. Collaborative Filtering Recommender Systems, Now Publishers Inc, 2011.
- Charu C. Aggarwal, Recommender Systems: The Textbook. Springer Cham, 2016.

**Course Content:**

**Topic**

I. Basic concepts of recommender systems
    A. User preference and ratings
    B. Prediction
    C. Taxonomy of recommenders

II. Recommendation algorithms
    A. Collaborative filtering
    B. Content-based filtering
    C. Matrix Factorization
    D. Neural-network-based methods
    E. Others

III. Algorithm evaluation and metrics
    A. Experiment design
    B. Prediction accuracy metrics
    C. Rank-aware top-N metrics

IV.     User experiences
        A.  Human factors in system design
        B.  User-centered evaluation

V.      Applications
        A.  E-commerce websites
        B.  Social media
        C.  Others (e.g., news, healthcare, etc.)