Title (Units): **COMP4135 Recommender Systems and Applications (3,2,1)**

Course Aims: In the current age of information overload, recommender systems offer personalized access for users to efficiently search 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 networks.

Prerequisite: COMP1005 Essence of Computing OR
COMP1007 Introduction to Python and Its Applications
AND
COMP3057 Introduction to AI and ML

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 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, matrix factorization, and content-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 networks.

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 Assignments	50%	1 - 6	Continuous assignments are designed to measure how well students have learnt 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 in recommender systems.

Assessment Rubrics:

Excellent (A)	• Achieve the seven CILOs, demonstrating a mastery of fundamentals of recommender system implementation and evaluation • Have a thorough understanding of concepts and technologies involved, and be able to explain and highlight the key points of these concepts and technologies • Able to reproduce recommender algorithms and conduct experiments
Good (B)	• Achieve the seven CILOs, demonstrating a good understanding of fundamentals of recommender system implementation and evaluation • Have a good understanding of concepts and technologies involved, and be able to explain and highlight the key points of these concepts and technologies • Able to reproduce recommender algorithms and conduct experiments for familiar cases
Satisfactory (C)	• Achieve most of CILOs, demonstrating a basic level of understanding of fundamentals of recommender system implementation and evaluation • Have a basic understanding of concepts and technologies involved • Able to reproduce recommender algorithms and conduct experiments for simple cases
Fail (F)	• Achieve less than three of CILOs, having little understanding of fundamentals of recommender system implementation and evaluation • Have little understanding of concepts and technologies involved, and unable to explain and highlight the key points of these concepts and technologies • 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, 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.
- Aggarwal, Charu C. Recommender Systems: The Textbook. Springer 2016.

Course Content:

Topic

I. Basic concepts of recommender systems
   1. User preference and ratings
   2. Prediction
   3. Taxonomy of recommenders

II. Recommendation algorithms
    1. Collaborative filtering
    2. Matrix Factorization
    3. Content-based recommendation
    4. Others

III. Algorithm evaluation and metrics
    1. Experiment design
    2. Prediction accuracy metrics
    3. Rank-aware top-N metrics

IV. User experiences
    1. Human factors in system design
    2. User-centered evaluation

V. Applications
    1. E-commerce websites
    2. Social networks
    3. Others (e.g., news, healthcare, etc.)