CSC 577: Recommender Systems
Winter 2022

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Office Hours: Tuesday, Thursday: 4:00-5:00 PM (held via Zoom or by phone; **appointments required**)

Course Description: Recommender systems offer personalized access to online information in product catalogs, social media networks, and document collections, among other applications. This class will introduce students to a range of approaches for building recommender systems including collaborative, content-based, knowledge-based, and hybrid methods. Students will implement recommendation algorithms using an open-source toolkit and conduct experimental evaluations.

Prerequisite: (CSC 412 and DSC 478) or (CSC 403 and DSC 441).

Course Management System: DePaul University's Desire2Learn system (d2l.depaul.edu).

- **Content:** This is where you will find most of the weekly material for the course, including lecture material, supplemental information such as class examples, and assignments.
- **News:** The primary form of communication for this class will be the news widget on the D2L. Please make sure you subscribe to the widget and that DePaul has you correct email address.
- **Forums:** The class forum is the preferred place to ask questions about the class material or assignments. All students should subscribe to the forums so that you receive email updates. Feel free to post questions related to assignments. You are also encouraged to post responses or to offer helpful suggestions for other students in class. However, please avoid posting solutions to the assignments. For questions of individual nature please contact me directly or make an appointment for office hours.

Note: The tentative course schedule, due dates, and information in this syllabus are subject to change. Consult the D2L site for the most up-to-date information.

Textbook: [Aggarwal, C. C., *Recommender Systems: The Textbook*](). Springer 2016. ISBN 978-3-319-29657-9. Available through the DePaul library.

Grading Policy: The final grade will be determined based on the following components:

- **Assignments** = 60%
- **Final Project** = 35%
    - 5% for Project Presentation on Week 10
    - 30% Final Project Submission during Finals Week
- **Presentation Evaluations / Participation** = 5%

The general grading scheme will be based on a curve, but the grade cutoffs will be no higher than: A = 90-100%, B = 80-89%, C = 65-79%, D = 50-64%, F = 0-49%. Within each grading range +/- grading will be used. At the end of the quarter, some individual adjustments may be made based on overall class performance as well as signs of individual effort

Assignments: Tentatively, there will be 3-4 programming assignments during the quarter. Assignments will typically involve using Python as well as various python libraries or toolkits to perform computational or data analysis tasks. Some assignments may also include written components. Any submitted documents (notebooks, reports, etc.) for the assignments must be typed and submitted through D2L by 12:59 PM on the specified due date.   Generally, late assignments will be penalized 10% per day (with weekends counting as one day). Unless otherwise specified, these assignments must be done individually. While students are permitted to discuss assignments at the conceptual level, students should not share specific answers (electronically or otherwise). The work in the assignments must represent the original work by the student. Any third-party sources or materials used in the development of solutions must be clearly referenced and attributed.

Final Project: A typical final project for the class can take of the following forms:

- **An Algorithm-Based Project**:
    - Implement and evaluate one or more recommendation algorithms not already part of the Surprise package
    - You may also choose to implement a recommender system that combines multiple approaches in interesting ways (e.g., combining collaborative and content-based methods, or developing other types of hybrid or ensemble recommendation approaches).
- **An Evaluation-Based Project**:
    - Find a data set from an interesting domain and do a comparative evaluation of different recommendation algorithms on the data set. The project should include a detailed analysis of the data set and basic interfaces for demonstrating the basic functionality of the system.

Projects will be done in groups of 2-3 students. You may choose your own groups or ask me to assign you to a group. **Groups must be formed by Week 3 of the quarter**. Each project team will submit a project proposal during Week 5 of the quarter.

Presentations: During Week 10, each project group will give a presentation describing their projects and discussing their (near final) results (more details on the format of presentation will be provided later). The presentations will be evaluated by other students in the class to provide constructive feedback. Project groups should take this feedback into account before the final project submissions.

Attendance/Participation: It is expected that you review all the weekly material for the classes in a timely manner, including lecture videos, class examples, and assigned readings. You should also regularly participate in the discussion forums and post questions and/or suggestions to help other members of the

class. During the first week, you are required to post an introductory message about yourself on the discussion forum.

Academic Integrity Policy: This course will be subject to the academic integrity policy of the university. More information can be found at **http://academicintegrity.depaul.edu/**. The university and school policy on plagiarism can be summarized as follows: Students in this course should be aware of the strong sanctions that can be imposed against someone guilty of plagiarism. If proven, a charge of plagiarism could result in an automatic F in the course and possible expulsion. The strongest of sanctions will be imposed on anyone who submits as his/her own work any assignment which has been prepared by someone else. If you have any questions or doubts about what plagiarism entails or how to properly acknowledge source materials be sure to consult the instructor.

Incompletes: An incomplete grade is given only for an exceptional reason such as a death in the family, a serious illness, etc. Any such reason must be documented. Any incomplete request must be made at least two weeks before the finals week and approved by the Dean of the College of Computing and Digital Media. Poor performance in the course or missing assignments during the quarter due to negligence will not be considered as valid reasons for such a request.

Resources for Students with Disabilities: Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential. To ensure that you receive the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that you have contacted the Center for Students with Disabilities (CSD) at:

> Student Center, LPC, Suite #370
> Phone number: (773)325.1677
> Fax: (773)325.3720
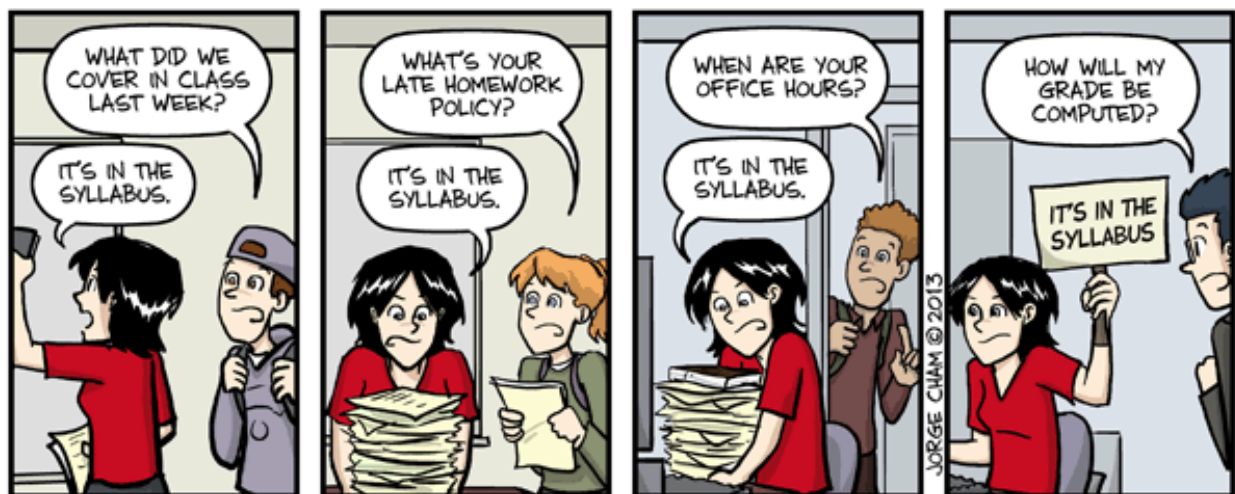> TTY: (773)325.7296

Online Teaching Evaluation: Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the students. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is completely separate from the student's identity. Periodic reminders are sent to students over the last three weeks of the quarter to complete the online evaluation. Students do not receive reminders once they complete the evaluation. Students complete the evaluation online in CampusConnect.

Tentative Weekly Schedule

	Topic	Readings
Week 1	1. Introduction to the Course 2. Overview of Recommender Systems Concepts 3. Review of Tools and Resources	Aggarwal: Ch 1
Week 2	1. Distances and similarities 2. Neighborhood based models 3. Clustering and CF	Aggarwal: 2.1-2.4
Week 3	1. Regression-Based Models 2. Gradient Descent 3. Basic evaluation metrics	Aggarwal: 2.6-2.7
Week 4	1. Latent Factor Model approaches 2. Matrix Factorization	Aggarwal: 3.5-3.7
Week 5	1. Content-Based Filtering 2. Feature representation and extraction 3. User Profiles	Aggarwal: 4.1-4.3
Week 6	1. Naïve Bayes 2. Bayesian and Probabilistic models 3. Combining Content-Based and Collaborative Filtering	Aggarwal: 3.4, 4.4-4.6
Week 7	1. Evaluating Recommender Systems 2. Evaluation beyond accuracy 3. Hybrid Recommender Systems	Aggarwal: 7.1-7.6; Ch. 6
Week 8	1. Graph-based view of recommenders 2. Recommendation in Networks	Aggarwal: 2.7; Ch. 10
Week 9	1. Context-Aware Recommendation 2. Selected Advanced Topics in Recommender Systems	Aggarwal: Ch. 8, Ch. 13
Week 10	Project Presentations	

Assignment/Project Due Dates at a Glance (Tentative)

Date	Item
01/09/2022	Post Introductory Comment on D2L
01/16/2022	Assignment 1 Due
01/23/2022	Project Teams Due
01/30/2022	Assignment 2 Due
02/05/2022	Project Proposals Due
02/13/2022	Assignment 3 Due
02/27/2022	Assignment 4 Due
03/06/2022	Project Presentations Posted
03/12/2022	Presentation Evals Submitted
03/18/2022	Final Project Reports Due

IT'S IN THE SYLLABUS

This message brought to you by every instructor that ever lived.

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