

**Syllabus**

**School of Professional Studies**

**DATA 612 – Special Topics: Recommender Systems**

**Instructor Name**: Latif Masud

**Instructor Email Address**: [latif.masud@sps.cuny.edu](mailto:latif.masud@sps.cuny.edu)

[latif.masud@hotmail.com](mailto:latif.masud@hotmail.com)

**Degree Program**: M.S. in Data Science

**Credits**: 3 graduate credits

**Prerequisites):** DATA 607, DATA 606, and DATA 602. Students with strong R or Python skills may have the DATA 602 pre-requisite waived. More advanced program course work will be helpful, but not assumed.

**Type of Course**: Elective course

## How is this course relevant for data analytics professionals?

Recommender systems and related ranking applications—are widely regarded as one of the most widely adopted commercial implementations of data science.

## Course Description:

In this course, students will learn to build and evaluate different kinds of recommender systems, using both R or /and Python. Some of the course work will be done using Apache Spark.

## Course Learning Outcomes:

By the end of the course, students should be able to:

* Build content management and collaborative filtering recommender systems in R or Python.
* Implement recommender systems using matrix factorization techniques (SVD and ALS).
* Implement hybrid recommendation systems.
* Understand business and deployment issues related to “explainability” a n d m a n a g i n g “a t t a c k s” on recommender systems.
* Implement recommender systems at scale under Apache Spark.

Source: https://xkcd.com/937/

# Assignments and Grading:

|  |  |
| --- | --- |
| **Projects (5)** | **50%** |
| **Research Discussions (2)** | **15%** |
| **Final Project** |  |
| **Proposal** | **10%** |
| **Presentation** | **5%** |
| **Submission** | **20%** |
| **Total** | **100%** |
| **Notes** |  |

* All projects and assignments, unless otherwise noted, are due end of day New York time on Mondays.
* **Course Completion Requirements**. To pass this course, you must minimally turn in at least four projects, and the final.
* You are required to make both a “Recommender Systems in Context” presentation and a final presentation. If you cannot deliver your presentation in the final Meetup, you will need to make available a video recording of your final presentation before that meetup. For students who opt to record their “Recommender Systems in Context” presentation, this presentation must be submitted before the start of our 6th meetup on July 10th.
* **Reproducibility Requirement, Testing Requirement, But Not Perfection!**

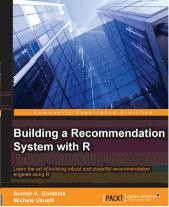
Students are responsible for providing all code and data so that I can test your work. All assignments—projects and research discussion assignments—need to be delivered in either a Jupyter Notebook or an R Markdown format. This code should be posted into your GitHub repository, and you should include a link to the GitHub repository in your assignment submission.

* If you turn in code that does not run, you will not receive full credit, unless you also include an explanatory note at the time of submission. At the same time, you don’t need to turn in perfect code. Generous partial credit will be given for deliverables that timely, tested, and reproducible. Cutting corners—as long as they are documented at the time of submission—is also acceptable.
* Students that complete all work in a satisfactory and timely manner will earn a maximum grade of A-. To earn a grade of A in this course, you will need to regularly demonstrate work above and beyond what is expected.



**Policy on Sharing and “Borrowed” Code.** In this course, you may collaborate and you may take base code from whatever sources you wish. But you *must* document what you started with, and what you added, so you are graded on your own contributed work! Other courses in the program may have stricter policies—always check with your instructor in advance.

# Course Learning Materials



## Required Text:

* + *Building a Recommendation System with R*, Suresh K Gorakala and Michele Usuelli, Packt Publishing, 2015.

# Relevant Software, Hardware, or Other Tools:

We will look at materials from a wide variety of sources. In particular, the videos from the University of Minnesota / Coursera course on recommender systems will be optional viewing throughout the course. These is an on-demand course with a “free” option and provides a conceptual (non-programming) overview of recommender systems.

We will make use of the R programming environment and the RStudio IDE, the Python 3.x data science stack, and Jupyter Notebooks. You’ll have the opportunity to work in Apache Spark in the cloud, using Databricks’ Community Edition. Motivated students who want to instead run their code on their own virtual machines or on another hosting service (such as Amazon, Web Services, Microsoft Azure, or Google Cloud) may do so, but they will be responsible for their own setups, configurations, and possible service charges.

# How This Course Works:

* + Meetups take place every week on Tuesdays from 7:00 p.m. to 8:00 p.m. EDT. Please see course site for specific dates and connection information. You are strongly encouraged to attend; all meetups will be recorded.
  + Office Hours are from 6:00 PM to 7:00PM EDT every Tuesday. If you need extra help and are willing to invest the time and effort to be successful, we will make the time to help you. But… you should not be asking for extra help on a project the day before it is due, since this indicates that you are not investing the time and effort to be successful.
  + You are encouraged to ask questions on the “Ask Your Instructor” forum on the course discussion board where other students will be able to benefit from your inquiries. For the most part, you can expect me to respond to questions by email within one business day.

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit** | **Topic** | **Core Readings** | **Deliverables** |
| **Unit 1**  **Jun 1 – Jun 7** | **Overview of Recommender Systems** | *Building a Recommendation System with R, chapter 1* | **Meetup on Tuesday**  **7:00pm EST**  **Environment Setup** |
| **Unit 2**  **Jun 8 – Jun 14** | **Content Management and Collaborative Filtering** | *Building a Recommendation System with R, chapter 2 and 3* | **Meetup on Tuesday 7:00pm EST**  **Project 1** |
| **Unit 3**  **Jun 15 – Jun 21** | **Matrix Factorization Techniques** |  | **Meetup on Tuesday 7:00 pm EST**  **Project 2** |
| **Unit 4**  **Jun 22 – Jun 28** | **Evaluating Recommenders** | *Building a Recommendation System with R, chapters 4 and 5* | **Meetup on Tuesday 7:00 pm EST**  **Project 3** |
| **Unit 5**  **Jun 29 – Jul 5** | **Spark and Distributed Computing** |  | **Meetup on Tuesday 7:00 pm EST**  **Project 4** |
| **Unit 6 Jul 6 – Jul 12** | **New Techniques and New Domains** |  | **Meetup on Tuesday 7:00 pm EST Project 5**  **Project 4Meetup on** |
| **Final Project**  **Jul 13 – Jul 19** |  |  | **Meetup on Tuesday 7:00 pm EST**  **Final Project Presentation**  **Project 4Meetup on** |

# Accessibility and Accommodations

The CUNY School of Professional Studies is committed to making higher education accessible to students with disabilities by removing architectural barriers and providing programs and support services necessary for them to benefit from the instruction and resources of the University. Early planning is essential for many of the resources and accommodations provided. Please see: <http://sps.cuny.edu/>student\_services/ disabilityservices.html

# Online Etiquette and Anti-Harassment Policy

The University strictly prohibits the use of University online resources or facilities, including Blackboard, for the purpose of harassment of any individual or for the posting of any material that is scandalous, libelous, offensive, or otherwise against the University’s policies. Please see: <http://media.sps.cuny.edu/filestore/> 8/4/9\_d018dae29d76f89/849\_3c7d075b32c268e.pdf

# ACADEMIC INTEGRITY

Academic dishonesty is unacceptable and will not be tolerated. Cheating, forgery, plagiarism, and collusion in dishonest acts undermine the educational mission of the City University of New York and the students' personal and intellectual growth. Please see: http:// media.sps.cuny.edu/filestore/8/3/9\_dea303d5822ab91/839\_1753cee9c9d90e9.pdf

# STUDENT SUPPORT SERVICES

If you need any additional help, please visit Student Support Services: <http://sps.cuny.edu/student_resources/>