Course Syllabus for SIADS 632: Data Mining II

Course Overview and Prerequisites

This course extends Data Mining I and introduces additional data representations and tasks involved in mining real world data, with a particular focus on sequence modeling, time series analysis, and mining data streams. It introduces how to extract patterns, compute similarities/distances of data, and make predictions under these data representations.

Instructor and Course Assistants

Instructor: Yumou Wei - yumouwei@umich.edu

Course Support: Yichao Chen; Anel Nurkayeva; Mel Nguyen

Course Communication Expectations

- Contacting instructor and course assistant: Course channel in Slack
- Email response time: 24 - 48 hours
- Slack response time: 24 - 48 hours
- Office hour sessions will be recorded for the benefit of students who are unable to join at these times. Password to join any Office hours is **632**

How to Get Help

If you have questions concerning the degree program, encounter a technical issue with Coursera, or issues using Slack, please submit a report to the ticketing system at umsimadshelp@umich.edu.

If you have an issue specific to the Coursera environment, you can also begin a live chat session with Coursera Technical Support (24/7) or view Coursera troubleshooting guides. (you may be asked to log in to your Coursera account).

For questions regarding course content, refer to the **Communications Expectations** section below.

Weekly Readings or Textbook Information

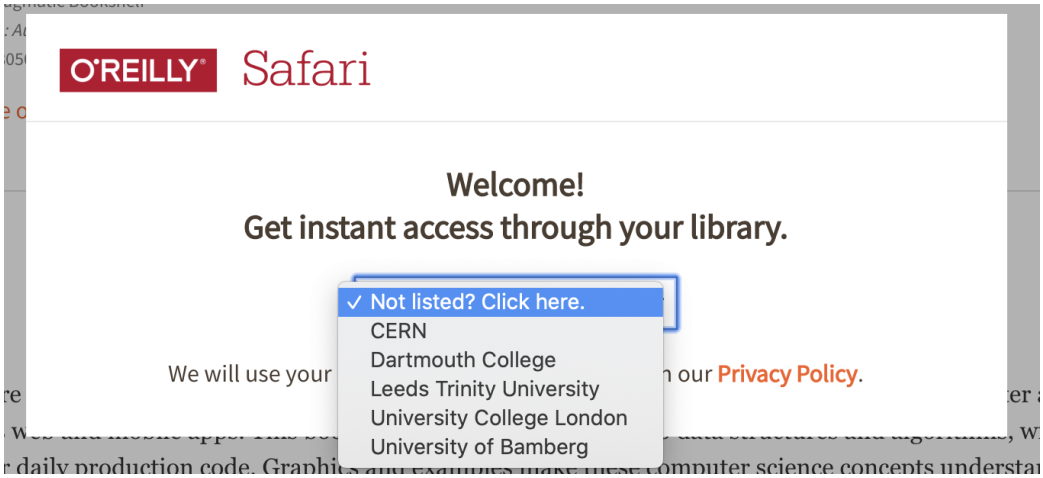
- Speech and Language Processing (3rd ed. draft) Dan Jurafsky and James H. Martin. (Chapter 3 and Appendix Chapter A).

- Data Mining: the Textbook, Charu C. Aggarwal. (Chapter 12 and Chapter 14).

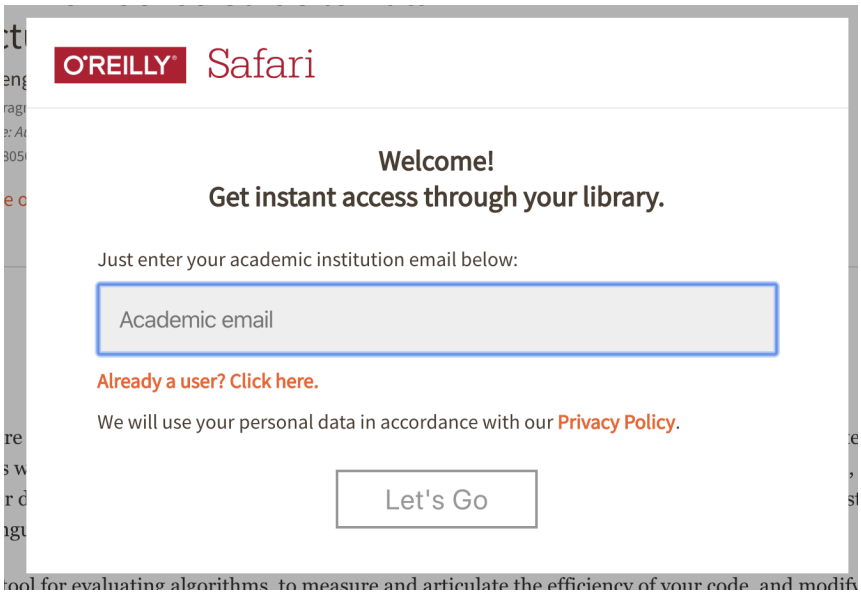
To access the required textbooks, simply click on the links above, which will direct you to the U-M Library website. Scroll down the page and click on *Available Online* (some texts will have multiple online options, but it is recommended you choose **Safari books online**).

Available online	Get This	N/A	Access to the Safari books online online version restricted; authentication may be required:

After you are directed to the textbook, you will see an O'Reilly pop-up window asking for you to select your institution. U-M is not an available option, so you will need to select the option "Not Listed? Click Here".



You will be prompted to input your U-M email address (no password required).



Learning Outcomes

- Be able to formulate real world data as sequences, time series, or data streams.
- Be able to formulate a real world problem as sequence prediction and solve it using N-Gram language models.
- Be aware of how Hidden Markov Models work.
- Extract patterns from time series data, including trends, seasons, cycles, and outliers.
- Measure similarity between time series.
- Conduct time series forecasting using autoregressions.
- Articulate the restriction of data streams and strategies for mining data streams.
- Implement Reservoir sampling, Bloom filter, and lossy counting.
- Name real world applications of these data representations and methods.

Course Schedule

- **This course begins on June 1, 2021 and ends on June 28, 2021.**

- Weekly assignments will be **due on Tuesday at 11:59 pm** (Ann Arbor, Michigan time-Eastern Daylight Time - EDT, UTC -4).

Weekly Office Hours via Zoom (Ann Arbor, Michigan time):

Your instructor will hold weekly, synchronous office hours using the video-conferencing tool, Zoom. The schedule of office hours can be found by clicking on the **Live Events** link in the left-hand navigation menu. Additionally, all office hours will be recorded and archived so that you can retrieve them at a later date. Archived office hours can be found in the respective module of the course.

Grading

Course Item	**Percentage of Final Grade**	**Due**
Week 1 Programming Assignment Group	25% (40%, 30%, 30% per assessment)	Tuesday 6/8 11:59pm
Week 2 Programming Assignments	25% (50% per assessment)	Tuesday 6/15 11:59pm
Week 3 Programming Assignment	25% (50% per assessment)	Tuesday 6/22 11:59pm
Week 4 Programming Assignments	25% (50% per assessment)	Tuesday 6/29 11:59pm
Total	**100%**	

Note: All assignments are required to earn credit for this course.

Letter Grades, Course Grades, and Late Submission Policy

Refer to the MADS Assignment Submission and Grading Policies section of the UMSI Student Handbook (access to Student Orientation course required).

For this course, the late submission policy is 15% reduction if assignment is turned in one day late, 30% reduction if two days late, 50% if reduction three days, and a zero (0) if four or more days late.

The grading scale for this course is as follows:

A	93%
A-	90%
B+	87%
B	83%
B-	80%
C+	77%

C	73%
C-	70%
D+	67%
D	63%
D-	60%
F	0%

Academic Integrity/Code of Conduct

Refer to the Academic and Professional Integrity section of the UMSI Student Handbook. (access to Student Orientation course required).

Accommodations

Refer to the Accommodations for Students with Disabilities section of the UMSI Student Handbook (access to the Student Orientation course required). Use the Student Intake Form to begin the process of working with the University's Office of Services for Students with Disabilities.

Accessibility

Refer to the Screen reader configuration for Jupyter Notebook Content document to learn accessibility tips for Jupyter Notebooks.

Library Access

Refer to the U-M Library's information sheet on accessing library resources from off-campus. For more information regarding library support services, please refer to the U-M Library Resources section of the UMSI Student Handbook (access to the Student Orientation course required).

Student Mental Health

Refer to the University's Resources for Stress and Mental Health website for a listing of resources for students.

Student Services

Refer to the Introduction to UMSI Student Life section of the UMSI Student Handbook (access to the Student Orientation course required).

Technology Tips

- Recommended Technology
    - This program requires Jupyter Notebook for completion of problem sets and Adobe or other PDF viewer for reading articles.
- Working Offline
    - While the Coursera platform has an integrated Jupyter Notebook system, you can work offline on your own computer by installing Python 3.5+ and the Jupyter software packages, including pyspark. For more details, consult the Jupyter Notebook FAQ.