Course Syllabus - SIADS 524: Presenting Uncertainty

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.

Course Overview and Prerequisites

This course covers strategies and techniques for effective uncertainty visualization. Uncertainty communication is essential for data analysts to learn, both to better understand their data and to effectively communicate the implications of data and models to others. This class covers a wide variety of uncertainty visualization techniques, including continuous uncertainty encodings, intervals, and frequency-framing approaches. Students will learn how each technique impacts people's ability to perceive and reason about uncertainty and what biases and pitfalls to be wary of when communicating uncertainty. Uncertainty visualization techniques are placed into a coherent theoretical foundation, the Grammar of Graphics, and programming exercises are conducted in a Grammar of Graphics-based API, Altair. Finally, as it is crucial to accurately represent the limits of our knowledge, strategies for dealing with large-world uncertainty (communicating uncertainty about model specifications themselves) will be discussed throughout.

Advisory Prerequisite: Visual Exploration of Data

Enforced Prerequisites: Math Methods for Data Science, Information Visualization I

Students should have seen different types of data plots (e.g., histograms, box plots) before entering the course (covered by the stats prerequisites), but they don't need to be able to generate them through programming. Students should have an understanding of probability and Bayes' rule (covered in Math Methods) and the Altair visualization library (covered in Infovis I).

Instructor and Course Assistants

Instructor: Nick Sheltrown - sheltro@umich.edu

Course Assistant: Jake Huang - yiju@umich.edu

Communication Expectations

- **Contacting your instructor and course assistant(s):** Use the course channel in Slack **(siads524_Wi21_001); for private messages the preferred method is to direct message us on Slack**. You can also email us (see above), but this is not preferred: Slack response time will be better than email.
- **Slack response time:** Slack is the preferred communication medium **for any questions and conversations that the group would benefit from,** such as questions relating to course structure, and assignment clarifications. Posts received by 5pm Eastern will receive a same-day response; posts after 5pm Eastern will receive a response within 24 hours. As has been done in other MADS classes, we are going to set up separate threads for each week under which you can post your questions. Please tag both instructors in your question so that we won't miss any questions posted. If you'd like to ask a private question, please send a direct message to both of us, instead of to an individual instructor, so that your questions can be answered more quickly. This also helps keep the instructional staff on the same page as we work through issues, because we see each other's answers.
- **Email response time:** 48 hours; use only if you have been unable to reach us in Slack.
- **Communicate proactively.** If you find yourself in the position that you are not going to have an assignment ready for a deadline, please reach out ahead of time to discuss your options. We often can find a satisfactory arrangement when we work with students proactively on any issues they are facing.

Required Readings

You will be given a list of required and recommended readings within the course. Online access to these readings are provided through the University of Michigan Library or through approved online sources. For resources provided through the library, you will be asked to sign in with your UMich uniqname and password to access these materials.

Technology Requirements

All course activities can be completed using core MADS technology, primarily Jupyter Notebooks within the Coursera platform. Accessibility For those who choose to use Jupyter Notebooks, please see the screen reader configuration for Jupyter Notebook Content. For other accommodations needed related to COVID-19, please reach out to the instructors in Slack.

Accessibility

For those who choose to use Jupyter Notebooks, please see the screen reader configuration for Jupyter Notebook Content.

Learning Outcomes

- Identify and describe the types of uncertainty associated with a model, including small world uncertainty, large world uncertainty, parameter uncertainty, and predictive uncertainty
- Read uncertainty visualizations
- Select appropriate uncertainty visualization encodings given the type of uncertainty and a decision-making task
- Assess how well an uncertainty visualization supports the tasks it was designed for
- Describe the difference between continuous and frequency-framing uncertainty visualizations and develop representations of either type for a visualization problem
- Assess whether an uncertainty visualization might be susceptible to misinterpretation, such as deterministic construal errors
- Produce uncertainty visualizations from statistical models using Altair
- Define uncertainty visualizations abstractly in terms of the Grammar of Graphics

Course Schedule

This course begins on **Wednesday, January 6, 2021,** and ends on **Tuesday, February 2, 2021.**

Assignments will be due Wednesdays at 11:59pm Eastern. The final assignment is due on Tuesday, February 2, 2021 at 11:59 pm Eastern.

Due to COVID-19, all assignments may be submitted 24 hours late without penalty with no explanation required. We know that the next month may throw some unexpected curveballs your way (and ours!); *please get in touch with us if other accommodations are needed*. You have up until the last day of class to withdraw if needed; please refer to the MADS Student Handbook for more information about procedures for incomplete grades.

Weekly Office Hours via Zoom

Please visit the Live Office Hours tab in the course to view formally scheduled Office Hours.

Grading

Course Assignment	Percentage of Final Grade
Quiz 1	5%
Notebook Assignment 1	20%
Quiz 2	5%
Notebook Assignment 2	20%
Quiz 3	5%
Notebook Assignment 3	20%
Quiz 4	5%
Notebook Assignment 4	20%
Total	**100%**

Note: All assignments must be completed 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).

The following represents the grading scale used in this course. Please note that conventional rounding rules will apply. For example, 93.50 will be rounded up to a 94 (A), but a 93.49 will be rounded to a 93 (A-).

A+ Rarely given and only at the discretion of the instructor.

A 94 +

A - 90 – 93

B+ 88 – 89

B 84 – 87

B - 80 – 83

C+ 77 – 79

C 73 - 76

C - 70 – 72

D+ 67 – 69

D 63 – 66

D - 60 – 62

E/F below 59

Late Submissions

This course moves at a rapid pace. To incentivize you to stay on track, once the COVID-19 24-hour grace period expires, there is a 15% daily penalty (including weekends) if an 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.

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 (requires U-M login) to begin the process of working with the University's Office of Services for Students with Disabilities.

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). Need research help? You may not know that U-M librarians can provide support for you and your research needs for this course. Find suggested resources on the MADS research guide, or feel free to reach out to UMSI's librarian, Shevon Desai, at shevonad@umich.edu -- it's not an imposition. It's what she's there for!

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).

Diversity

Diversity, equity, and inclusion matter at UMSI. Collaboration helps us develop interdependence and benefit from diverse perspectives and skills. For more information, please visit https://www.si.umich.edu/about-umsi/diversity-equity-inclusion-school-information.