

STAT 486/586: Introduction to Statistical Computing

Delivery method: In-person lectures

Meeting times and location: Tuesday and Thursday 9:30 am – 10:45 am, Howe 1252
Lecture recording will be posted on Canvas

Instructor: Xiongtao Dai

Email: xdai@iastate.edu. Only for personal issues

Office hours: TBD, and by appointment

– Physical location: TBD

– Also available on Zoom: <https://iastate.zoom.us/j/93009772568?pwd=aWlWWHN0SmN2U011K3BiejhFK3E4Zz09>

Teaching assistant: Yuhang (Tom) Lin

Email: yhlin@iastate.edu. Only for personal issues

Office hours: TBD, and by appointment

– Physical location: TBD

– Also available on Zoom: <https://iastate.zoom.us/j/93009772568?pwd=aWlWWHN0SmN2U011K3BiejhFK3E4Zz09>

Prerequisites: STAT 301 or STAT 326 or STAT 401 or STAT 587

Materials related to matrix: There will be materials related to matrix calculation and linear algebra. These will be optional for a student who was not exposed to matrix in the previous coursework. The student should inform the instructor in writing. The matrix materials and assessment will then be replaced by a topic proposed by the student after consulting with the instructor.

Course description: Modern statistical computing. Topics may include:

1. Fundamental of R
2. Working with different data structures
3. Programming with R
4. Functional programming in R
5. Simulation
6. Resampling methods
7. Statistical learning
8. Visualization
9. Data wrangling

What you will learn: Be able to

- Perform statistical analyses reliably in R;
- understand programming concepts;
- learn some principles and methods for statistical/machine learning;
- handle and visualize complex data; and
- perform analyses efficiently

How you will learn: In a typical week, you will

- attend lectures on Tuesday and Thursday;
- post questions on Piazza and attend office hours;
- finish a weekly individual quiz by Thursday; and
- hand in your assignment in a week

Computer software: This class will be teaching the R language (<https://www.r-project.org/>). The version control system git will be covered.

Optional reading materials:

- *Advanced R, 2nd Edition*, Hadley Wickham, <https://adv-r.hadley.nz/>
- *R for Data Science*, Garrett Golemund and Hadley Wickham, <https://r4ds.had.co.nz/>
- *R Cookbook, 2nd Edition*, James (JD) Long and Paul Teetor, <https://rc2e.com/>
- *An Introduction to Statistical Learning, 2nd Edition*, Gareth James, Daniela Witten, Trevor Hastie, Rob Tibshirani, <https://www.statlearning.com/>
- *All of Statistics*, Larry Wasserman

Course webpage: We will post course materials and announcement on Canvas. Some of the materials are adapted from those developed by Drs Heike Hofmann and Lily Wang.

Whiteboard notes: Occasional notes made in class will be posted here: https://iowastate-my.sharepoint.com/:o:/g/personal/xdai_iastate_edu/EtyTwp429NtLisyY5dsYRgIBJqqf_XgT3Eqv33I-UdFpfA?e=0z0j00. (Bookmark this page!)

Piazza: We will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. *Instead of emailing questions to the TA and the instructor, you will post all your technical questions on Piazza.* Piazza is integrated into Canvas so you can access it there; alternatively, visit piazza.com/iastate/spring2022/stat486586 in your browser. The response time is 24 hours. Email the TA and the instructor only for personal matters. We will be using the freemium version of Piazza. *Making financial contribution to Piazza is completely optional.*

When posting on Piazza, please follow adequate netiquettes:

- Be polite and respectful to others.
- Search before you post. Your question may have already been asked and answered.
- When you post a question, please explain the context and give an example of what you have issue with. Posting screenshots and asking “What is going wrong?” is unacceptable.
- Providing a [reproducible example](#) will greatly help others help you
- Posting short snippet of code is fine, but please refrain from posting a complete solution to a question.

Quizzes: There will be weekly individual quizzes posted on Canvas. The quiz questions are supposed to be relatively simple and can be immediately answered after learning from the two lectures. The individual quizzes are due by Thursday at 11:59 pm, and will be immediately graded. You have two attempts for each quiz. The higher score from the two attempts will be kept.

Homework: There will be weekly homework assignments throughout the semester except for the midterm week. Homework are to be finished individually. Feel free to discuss the assignments with anyone in the class, including your classmates, TA, and the instructor. However, you must write the assignments individually.

Plagiarism detection will be strictly enforced using the Measure Of Software Similarity (MOSS, <https://theory.stanford.edu/~aiken/moss/>).

Late homework: Homework up to three days late will be accepted but will receive a penalty; homework more than three days late will not be accepted. We will try to accommodate requests to extend the deadlines because of health, family, and work issues, etc. However, *only requests that are made 48 hours before the deadline will be considered.*

Midterm exam: There will be one midterm exam on March 24 from 9:30 am to 10:45 am (no lecture on that day). The midterm will be an open-book open-Internet take-home exam. You cannot obtain help from anyone else, however. The midterm exam will test on your understanding of R, statistical learning, data wrangling, graphics production, and real data analysis, etc. There is no final exam or project.

Participation: Active participation in class, office hours, and on Piazza are expected and will be assessed.

Grading: Letter grades will be assigned by the instructor. The grade may be curved, but only in a direction beneficial to the students. The standard grading scheme (90% A-range, 80% B-range, etc) will apply to the undergraduate students enrolling in STAT 486. The expectation for graduate students enrolling in STAT 586 may be higher, but by no more than 2% for each range. The graded components are

- 15% weekly quizzes
- 60% homework
- 20% midterm exam
- 5% participation (primarily Piazza)

Academic dishonesty: The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office:

<http://www.dso.iastate.edu/ja/academic/misconduct.html>

Face masks encouraged: Because of the continuing COVID-19 pandemic, all students are encouraged—but not required—to wear face masks, consistent with current recommendations from the Centers for Disease Control and Prevention. Further information on the proper use of face masks is available at: <https://www.cdc.gov/coronavirus/2019-ncov/your-health/effective-masks.html>

Vaccinations encouraged: All students are encouraged to receive a vaccination against COVID-19. Multiple locations are available on campus for free, convenient vaccination. Further information is available at: <https://web.iastate.edu/safety/updates/covid19/vaccinations> Vaccinations may also be obtained from health care providers and pharmacies.

Physical distancing encouraged for unvaccinated individuals: Classrooms and other campus spaces are operating at normal capacities, and physical distancing by faculty, staff, students, and visitors to campus is not required. However, unvaccinated individuals are encouraged to continue to physically distance themselves from others when possible.

Free expression: Iowa State University supports and upholds the First Amendment protection of freedom of speech and the principle of academic freedom in order to foster a learning environment where open inquiry and the vigorous debate of a diversity of ideas are encouraged. Students will not be penalized for the content or viewpoints of their speech as long as student expression in a class context is germane to the subject matter of the class and conveyed in an appropriate manner.

Classroom disruption policy: The class will follow university's Classroom Disruption Policy outlined

here www.studentassistance.dso.iastate.edu/faculty-and-staff-resources/disruption.

Other course policies and accommodation: www.celt.iastate.edu/teaching/preparing-to-teach/recommended-iowa-state-university-syllabus-statements/