

Advanced Topics in Regression

Instructor: Dr. Hongxiao Zhu
Office: Hutcheson Hall 403H
Email: hongxiao@vt.edu
<http://www.apps.stat.vt.edu/zhu/>

Modality: face-to-face instructions (mask is required)

Time: Tuesday and Thursday 5:00P M–6:15 PM

Location: Hutcheson Hall 204

Office hour: By appointment (online through zoom)

Canvas site: Lecture slides, notes, and homework assignments will be posted on the course's canvas site.

Course description: This course is designed to continue the student's education in the area of regression analysis. The following is a list of (tentative) topics to be covered:

Computational Aspects

1. Optimization theory and algorithms
2. Variational inference

Regularized Parametric Regression

3. Lasso and theory
4. Extensions beyond Lasso
5. Feature screening

Nonparametric Regression

6. Kernel and Spline smoothing
7. Reproducing Kernel Hilbert Space
8. Additive models and generalized additive models
9. Multidimensional Smoothing Splines

Selected Topics

10. Neural Network regression
11. Manifold regression
12. Topic
13. Topic

Prerequisites: It is expected that the student is familiar with linear models and regression analysis, both at the M. S. (in statistics) level. Prerequisite material is covered in STAT 5124 and STAT 5514.

Textbook: There is no textbook. Reference materials will be given in lectures.

Grading: Homework: 35%, Midterm: 30%, Final: 30%. Additional credits: 2 credits = 5%

Homework: There will be a few homework assignments. Students who volunteer to help grade homework will receive two additional credit points for each grading (added directly to the final grade).

Midterm exam: Midterm is take-home.

Final projects: final project involve two modules: presenting a paper or book chapter (10%) and writing a review of that paper (20%). You need to hand in your report to canvas.

Submission policy: Homework will be submitted and graded on canvas. If you don't have a scanner, you may take pictures of the written part and merge them to PDF. This can be done by using cell phone apps such as Image to PDF converter. If the homework involves coding, you are required to submit the original code (e.g., .R script). Please make sure the submitted document is clear enough to be graded.

Homework policy: A due date is shown on each homework assignment. Late homework is only accepted when it is submitted no later than three days after the deadline. Late homework is subject to an extra deduction of 20% per late day. Class attendance is required unless there are medical conditions or other reasonable obligations. If you have a medical condition or an obligation that will result in missing a class, let me know ahead of time.

COVID-19 statement:

- Vaccination and booster shot are required.
- Mask is required.
- Physical distancing. While not required by university, I encourage students to keep social distancing when taking seats in classroom.
- If you have symptoms of COVID-19, isolate yourself by staying at home and get a covid test. Do not attend in-person class meetings until you get a negative test result and the symptoms disappear.
- If you are tested positive or have close contact of positive cases, do not attend in-person class meetings, and follow the following link for conducting isolation and quarantine:
<https://ready.vt.edu/positive-cases-isolation-quarantine.html>

Resources about most recent university policies regarding COVID-19 can be found at: <https://ready.vt.edu/>.

Honor code: Graduate students enrolled in this course are responsible for abiding by the Graduate Honor Code. For additional information about the Honor Code, please visit:

<http://graduateschool.vt.edu/academics/expectations/graduate-honor-system.html>.