It Really Starts Here:
Developing Statisticians in an Introductory Regression Course

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Background and Setting

The introductory regression course is often the first exposure that statistics majors have to experience the versatility of statistics across disciplines. Therefore, it is pivotal to spark interest and develop fundamental analytical skills in this course, if the intention is to produce statisticians upon graduation.

- The introductory regression course (STAT 3220) at the University of Virginia is required for every statistics major and minor.
- The course is offered every semester and has an enrollment of about 60 students per section.
- Course topic coverage: multiple linear regression (nine weeks); logistic regression (one week); experimental design (one week); one factor and two factor ANOVA (one week)
- Students learn and use SAS as their primary tool for analysis

"I thought that the final project was a really good way to learn more about our topic while integrating everything we learned in class. I liked doing our own research and figuring out how to run the analysis. It also gave us a good opportunity to practice SAS."

"I felt that I learned how to code better during the final project. In class we learned many possible ways to use SAS but in the project, we needed effective and simple code so that we could share it with other group members and save time."

Project Scope

This project allows students to demonstrate and improve their skills in independent learning, analytics, and communication.

- Students in groups of 3-4 select a technique, find a data set, analyze the data and present their results in a written and oral presentation.
- Topics for final project: model validation, weighted least squares, logistic regression (beyond lecture), ridge regression, LASSO regression, robust regression, time series regression, additional post-hoc ANOVA analyses, three factor ANOVA, Poisson regression, survival analysis
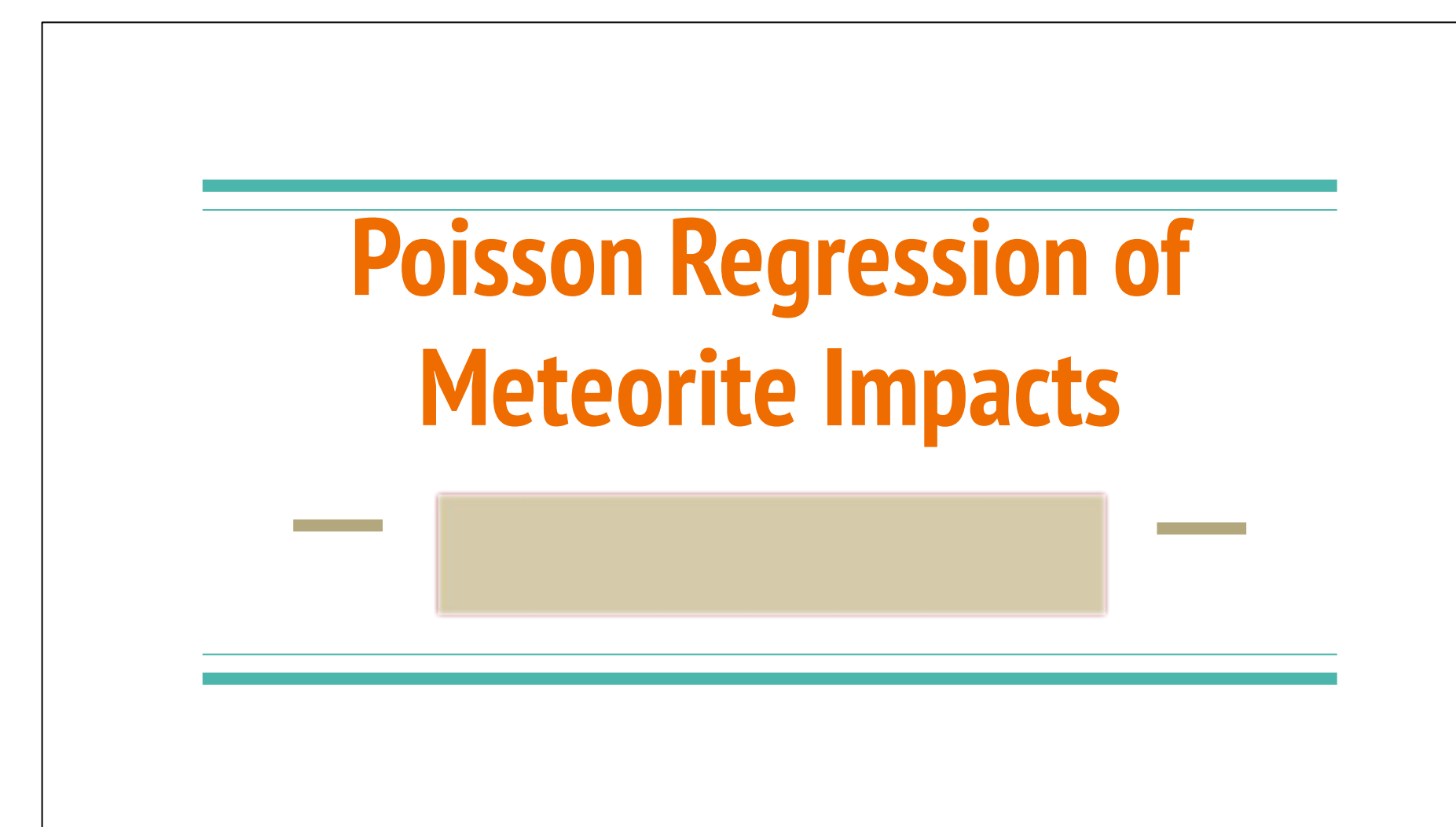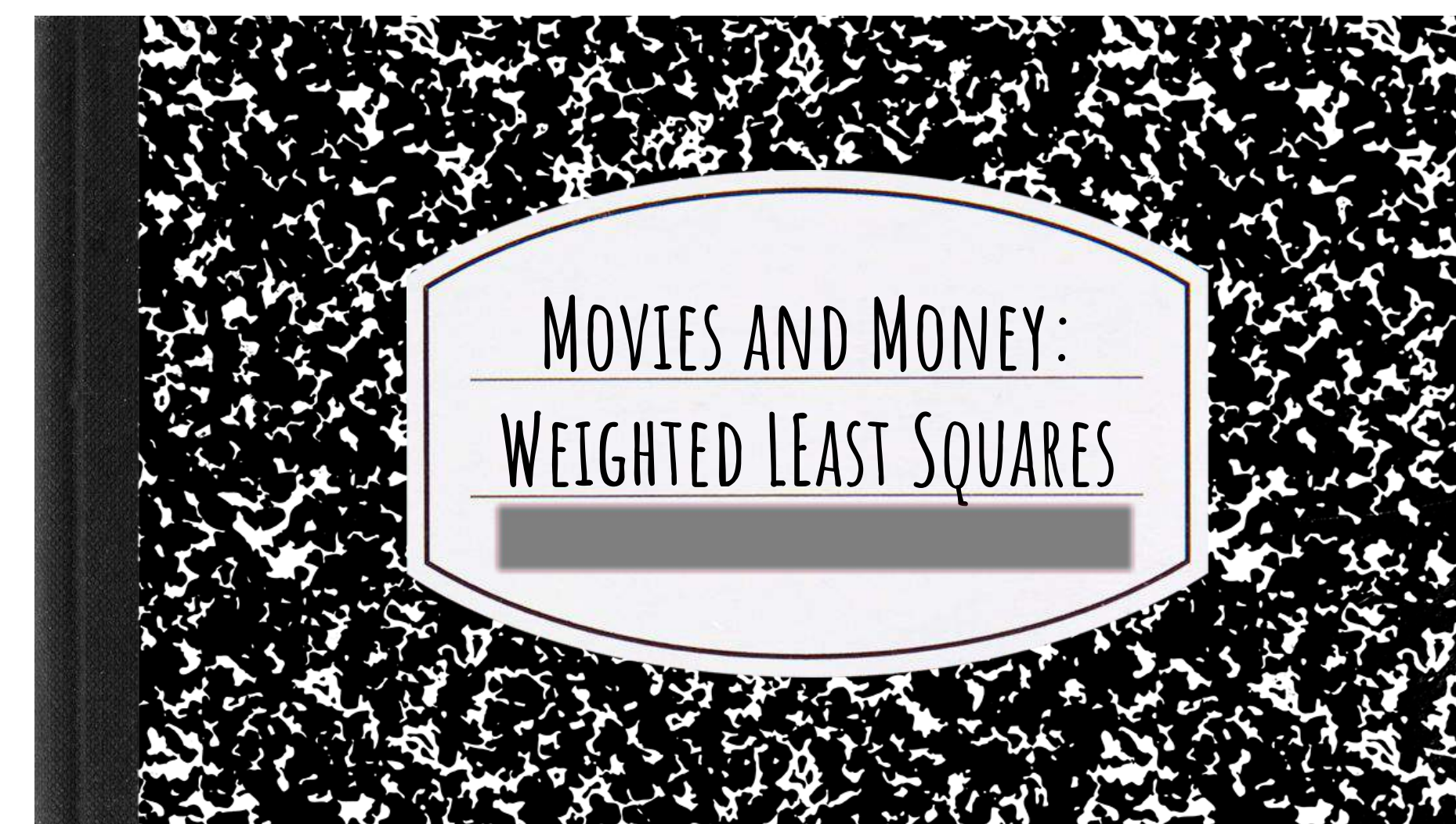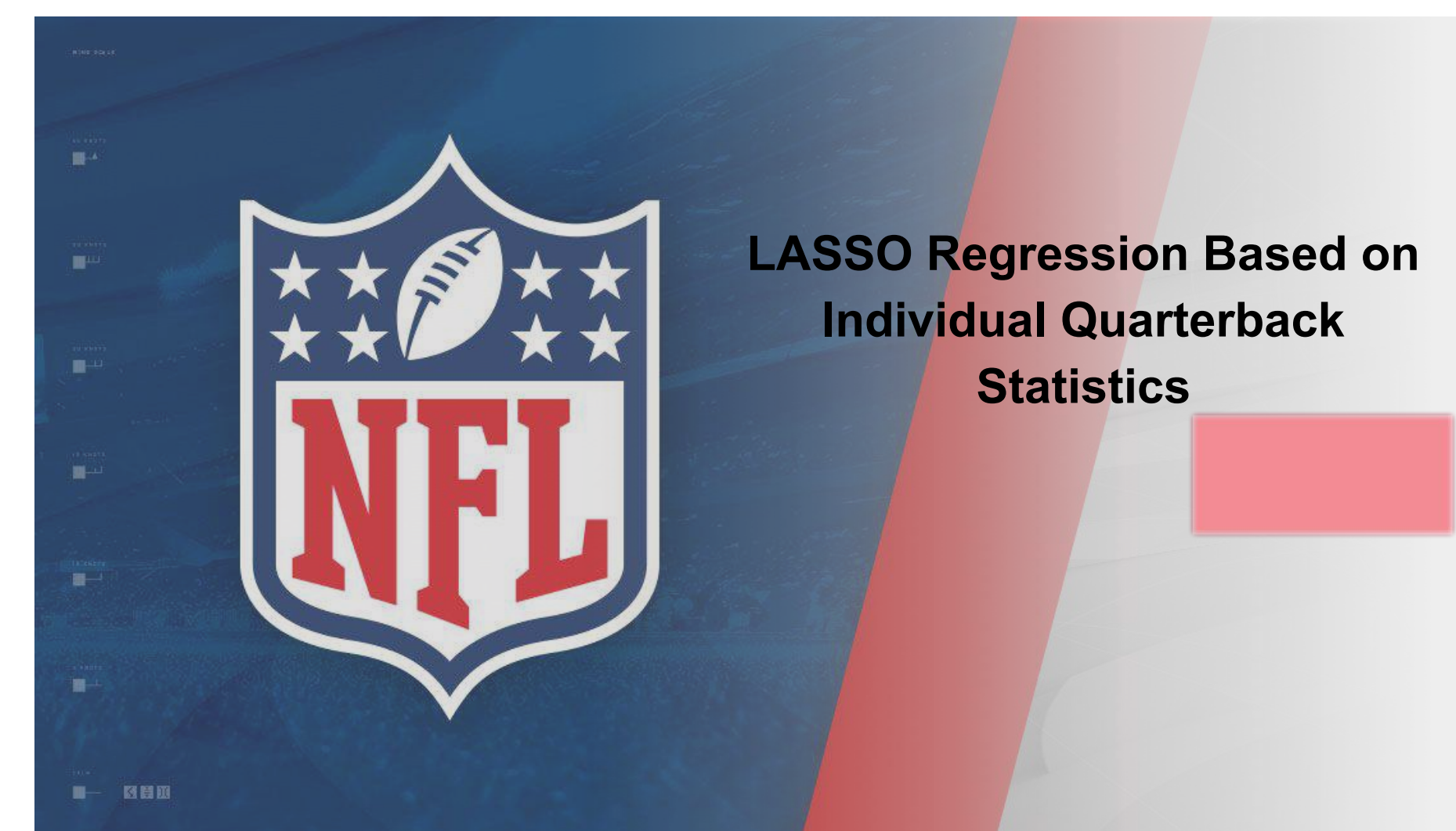
Group Assignment
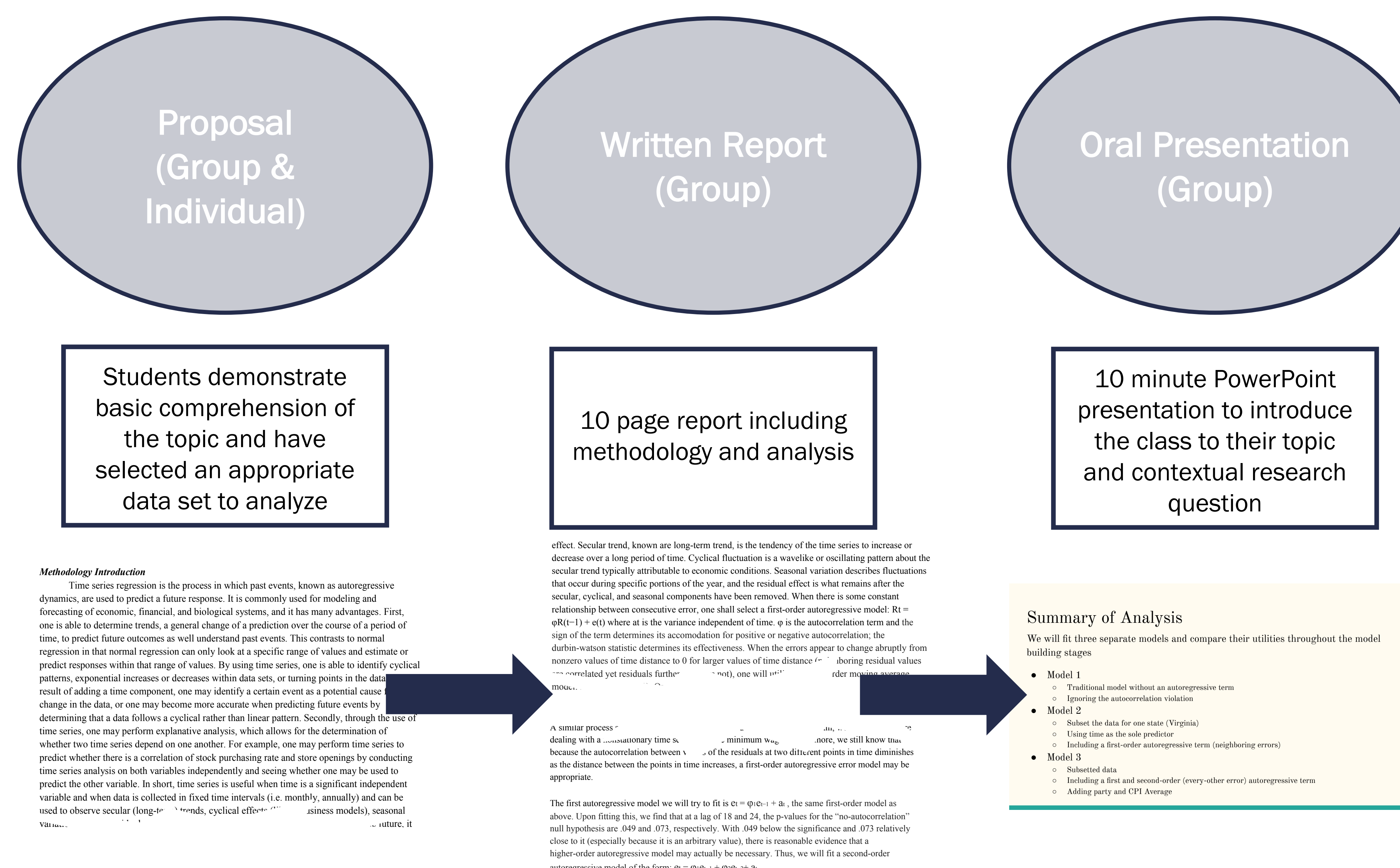
Students were assigned to groups using CATME.

- This combines various metrics to create successful group dynamics by aligning students on availability, desired effort and reading ability.
- Additionally, CATME allows the instructor to group students based on group measures that accommodate student preferences.

CATME SMARTER Teamwork

Project Examples

LASSO Regression Based on Individual Quarterback Statistics

Recidivism in the Iowan Prison System

MOVIES AND MONEY: Weighted LEast Squares

Poisson Regression of Meteorite Impacts

Project Components

Proposal (Group & Individual) — Students demonstrate basic comprehension of the topic and have selected an appropriate data set to analyze

Written Report (Group) — 10 page report including methodology and analysis

Oral Presentation (Group) — 10 minute PowerPoint presentation to introduce the class to their topic and contextual research question

Foster Independent Learning

A main objective is for students to work and learn independently. Consider the following to best support students in the process:

- Require Project Proposal
- Project Workshops
- Schedule mandatory group meetings
- Provide additional resources
- Add homework problems about technique

"My favorite part about this project was that we did a proposal and got feedback on it."

"I honestly wish we would have had the homework-like problems to complete as part of the individual proposal component..."

"Perhaps requiring each team to meet with the professor and discuss the actual statistical method to ensure they fully understand it would help."

Timeline

Ideally, from start to finish, students would have 4-5 weeks to complete the project from when it is assigned. Consider the following when establishing a timeline:

- Group & topic assignment
- Project work days
- University breaks
- Course exams
- Professor availability for group meetings
- Proposal deadline
- Presentation style (oral vs poster?)

Greater Impact

Beyond a technique: students learns skills in teamwork, communication, and report writing.

"I am very thankful for this project because I learned how to work in a team environment and improve my ability of self-learning."

"I learned a lot in this project, for example, it gives (sic) me a basic concept of writing stat project, how to deal with the SAS code."

"This project taught me a lot about group work in college. One important thing I learned was the power of thorough communication."