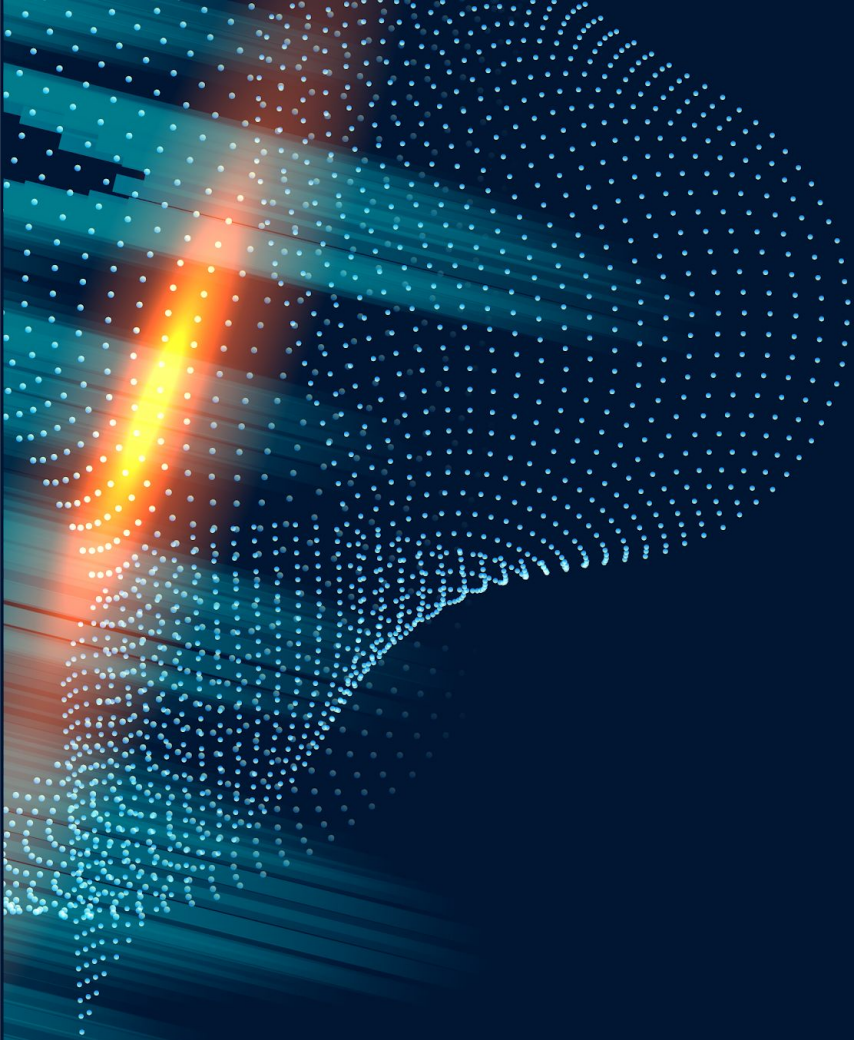# SMART Program

Statistical **M**entoring in **A**pplication, **R**esearch, and **T**echnology

Department of Statistics

Winter 2022 Info Session

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The mission of the SMART program is to provide undergraduate students with the opportunity to conduct statistical projects under the supervision of graduate students and to provide graduate students with an opportunity to develop projects and mentor students.

01 Who can participate?

MENTORS

- STAT graduate students (MS/PhD)

FELLOWS

- Undergraduate students majoring in STAT or DTSC (geared towards seniors/juniors).

- Interested in attending graduate school.

- Must be able to commit to an average of 5 hours per week for one quarter.

- Can only participate in the program once per year.
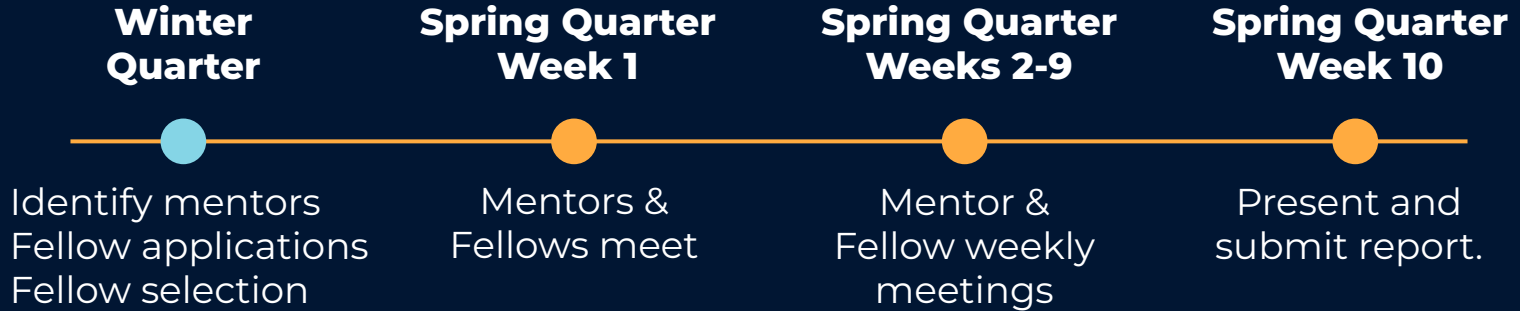
02 What do participants do?

MENTORS

- Create a project that an undergraduate student can complete within 6-8 weeks.

- Set prerequisites.

- Gather teaching materials.

- Mentor an undergraduate student for the duration of the quarter.

- Meet with an undergraduate student for 1-2 hours a week.

- Monitor student progress and adjust the project as needed.

02 What do participants do?

FELLOWS

- Work on a project under the guidance of a graduate student.

- Spend an average of 5 hours per week on the project.

- Meet with a graduate student mentor for 1-2 hours per week.

- Develop a report and presentation for the end of the quarter.

- Present their work at a Department Colloquium

TIMELINE OVERVIEW

Winter Quarter	**Spring Quarter Week 1**	**Spring Quarter Weeks 2-9**	**Spring Quarter Week 10**
Identify mentors Fellow applications Fellow selection	Mentors & Fellows meet	Mentor & Fellow weekly meetings	Present and submit report.

03 Why is this program valuable?

MENTORS

- Leadership Opportunities
- Mentoring Experience
- Collaboration
- Communication
- **Community Building**

FELLOWS

- Project experience
- One-on-one guidance
- Exposure to topics outside of curriculum
- Communication: one-on-one and presenting
- Informally learn about grad school experiences and process
- **Community Building**

4 Mentors

- **Benjamin (Jeff) Ellis**
- **Rebecca Kurtz-Garcia**
- **Trey McGonigle**
- **Noe Vidales**

Project Overview: **Benjamin (Jeff) Ellis**

Topic: Generalized Additive Models (GAMs)

Description: Learn basic theory of nonparametric regression, and how to flexibly model nonlinear relationships. Emphasis will be placed on applications to a dataset of student's choice (medical, engineering, business etc.), with coding done in R/Rstudio.

Prerequisites:
- STAT 107 (147)
- STAT 170 (170A)
- Recommended concurrent enrollment in STAT 169 (170B).
- Recommended concurrent enrollment in STAT 171.

Project Overview: **Benjamin (Jeff) Ellis**

Goals / Topics:

1) Connect theory and real world application
2) Improve coding capabilities, utilize graphs, and write professional reports using LaTeX
3) Expand toolbox of statistical models

Project Overview: **Rebecca Kurtz-Garcia**

Topic: Financial Time Series

Description: Time series data appears in a wide variety of fields which all have their own unique problems. Time series data sets are particularly prevalent in finance and economics. In this project we will be learning about time series analysis in the econometrics settings. In particular, we will look at time series analysis as an extension of simple linear regression with various different error structures and types of explanatory variables. We will discuss alternative sets of assumptions needed for good estimators, and extensions of well known estimation methods. The information learned here can be applied to all fields where time series arises, not just financial data.

Prerequisites: STAT 170 (170A)

Project Overview: **Rebecca Kurtz-Garcia**

Goals / Topics:

1) Learn about time series analysis as an extension of standard linear regression.

2) Learn about different models and the corresponding assumptions needed which will obtain good estimators in time series analysis.

3) Understand real-world examples of time series problems, estimation techniques, and testing procedures.

Project Overview: **Trey McGonigle**

Topic: Survival Analysis

Description: Learn how to analyse time-to-event data, with censoring, through various survival techniques including Kaplan-Meier estimators, & Cox proportional hazards models.

Prerequisites:
- STAT 107 (147)
- STAT 170 (170A)
- Recommended concurrent enrollment in STAT 169 (170B).
- Recommended concurrent enrollment in STAT 171.

Project Overview: **Trey McGonigle**

Goals / Topics:

1) Understand how and when to deploy survival models

2) Emphasize the process of variable selection and diagnostics in evaluating models

3) Learn to create presentations using LateX and further develop presentation skills

Project Overview: **Noe Vidales**

Topic: Probit Regression Bayesian Analysis

Description: Learn how to analyze binary data with a probit regression. Learn the differences between frequentist and Bayesian approaches.

Prerequisites:
- STAT 161
- Concurrent enrollment in STAT 171

Project Overview: **Noe Vidales**

Goals / Topics:

Learn about

1) Probit Regression.

2) The difference between Bayesian and Frequentist approaches.

3) Markov Chains and Gibbs block Sampler.

4) How to sample from intractable distributions.

5) Diagnostics to determine quality of estimate.

APPLICATION PROCESS

Winter 2022

Friday (Week 6)
2/11/2022

Friday (Week 8)
2/25/2022

Friday (Week 10)
3/11/2022

Applications
Open

Applications
Close

Applications
Reviewed

Fellows
Notified

APPLICATION Materials

1) Courses taken and R experience

2) What are your career goals? (Word Limit: 300)

3) How would you benefit in participating in the SMART Program? (Word Limit: 300)

4) Do you plan to attend graduate school?

5) Upload a 1-2 page Resume (Submit a PDF)

6) Project Interest Ranking

THANK YOU!

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