

STA 3064 Introduction to Statistical Modeling with SAS Fall 2019 Course Syllabus

Instructor: Dr. Steven Ramsier

Office: 106A OSB

Office hours: 12:30 PM to 1:30 PM on Tuesdays and 10:30 AM to 11:30 AM on Wednesdays.

Phone: 644-3218 (Main Statistics office phone – currently no direct line to the instructor)

Fax: 644-5271

Class URL: fsu.instructure.com

TA Grader for Assignment/Case Study: Nathan Lane

E-mail: nal18d@my.fsu.edu

TA for Help Room/Projects: Yuxi Zhao

E-mail: yz17m@my.fsu.edu

Class Meeting Times: 9:30 - 10:45 AM Tu Th in 108 OSB

Help Room Times: 2:00 - 3:15 PM Tu Th in 0309 MCH

Final Period: *Monday, Dec. 9, 7:30 AM to 9:30 AM*

Optional Text: Cannon, A.R., Cobb, G.W., et al., *Stat2: Modeling with Regression and ANOVA* (2019), *Second Edition*, W.H. Freeman and Company.

ISBN-10: 1-319-05407-2

ISBN-13: 978-1-319-05407-6

Other references will be provided during the course of the semester.

Internet: Online access required for SAS programs and learning management system

Prerequisite: STA3024 or consent of the instructor.

Software: Access to *SAS Studio* (Online, On-Demand version), *SAS University Edition* (Local computer version), or *SAS 9.4* (Windows version available on campus computer labs but differs slightly from the other two versions which will be used in class).

Course Description: This course will cover the following topics utilizing the SAS software: ANOVA, linear modeling, logistic regression, bootstrap sampling, simulation using the data step, and some additional analytic topics.

Students will gain experience in fitting statistical models to data in order to extract information, determine significant factors, and make predictions. Students will be exposed to several popular models including both general linear and generalized linear models in order that they will be able to make informed decisions and appropriate model selection in the future.

Course Objectives: This course is designated as a *Scholarship in Practice* course.

Scholarship in Practice Objectives. By the end of the course, students will demonstrate the ability to:

- Select, critically evaluate, and apply relevant areas of scholarship to produce an original analysis, project, creative work, performance or other scholarly work that reflects a body of knowledge relevant to the course (*SIP1*);
- Articulate the process of producing a work, from initial plan, to critique, revision, and completion (*SIP2*);
- Critique existing applications of scholarship in order to learn from past success and failures (*SIP3*).

Competencies SIP1, SIP2, and SIP3 will be assessed through the assignments and capstone project for STA 3064 for which a standard rubric will be employed to facilitate a written summary of results.

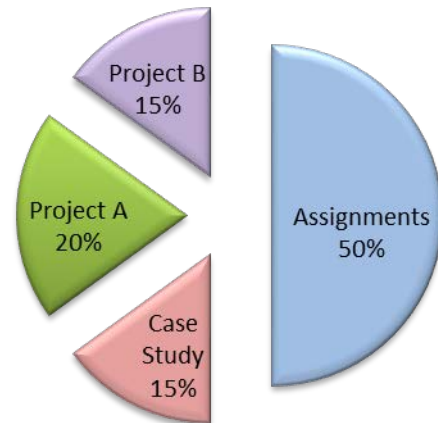
General Course Objectives. Students who complete this course will be able to:

- Choose the appropriate statistical model for given data and situations.

- Analyze differences between population means using the ANOVA and GLM procedures and verify the assumptions.
- Perform pairwise comparisons among groups after finding significant effects in ANOVA.
- Fit a simple linear regression using the REG procedure producing predicted values and confidence intervals.
- Explain the mathematical model for multiple regression.
- Describe model selection options and interpret output to evaluate the fit of several models.
- Perform model diagnostics through residual plots, influential observations identification, and collinearity detection.
- Fit a binary logistic regression model using the LOGISTIC procedure.
- Define and explain the adjusted odds ratio.

Grade Composition (1000 Points Total):

| | |
|-----------------------------------------|------------|
| 5 Take-Home Assignments (100 pts. each) | 500 |
| Case Study | 150 |
| Project A (Team Written Project) | 200 |
| Project B (Team Presentation Project) | <u>150</u> |
| Total | 1000 |



Grade Assignments (Based on total course points earned):

| | | |
|-------------|------------|------------|
| A 930-1000 | B- 800-829 | D+ 670-699 |
| A- 900- 929 | C+ 770-799 | D 630-669 |
| B+ 870-899 | C 730-769 | D- 600-629 |
| B 830-869 | C- 700-729 | F 0-599 |

Assignments and Responsibilities

Take-Home Assignments

The assignments will consist of problems that will be solved using SAS. There will be five (5) assignments given and all assignments are to be turned in on the Friday that they are **due no later than 5:00 PM**. Assignment documents are uploaded via Canvas and **no emailed assignments will be accepted**.

Late, unexcused assignments will be penalized as follows: turned in by 5:00 PM the following day (Saturday) – 90% of grade, turned in by 5:00 PM the Sunday after it was due – 75% of grade, thereafter – no credit. Assignments are graded on several components: Correct functions and/or procedures, properly executable, correct results, and correct interpretations. Assignments will be submitted electronically through Canvas.

You are free to discuss the assignment with any of your classmates; however, the activity of students “working together” is not permitted. Your programming, interpretation, and write-up must be done independently. That is, all code, output, and explanations must be generated by you. Your interpretations must be in your own words. Sharing documents and using any portion of another student’s (past or present) work, representing it as your own, will result in a score of zero on the assignment.

Warning about Using SAS Studio Online: Access to SAS Studio is done through a web browser and is mostly reliable. However, the program is run on SAS’s servers and SAS allocates the resources in order for the program to run smoothly. In the past students have experienced outages and, although these are generally temporary, these can cause students to take longer to complete tasks than would normally be anticipated. Around assignment due dates and times can be especially problematic as several people are attempting to get on the server at once and therefore experience more outages. Understanding this, **a temporary server outage is not a valid excuse to turning in an assignment late**. Good advice is to allow yourself plenty of time to complete your assignments. Please start assignments early to avoid the frustration that a server outage can cause. Trying to

complete an assignment at the last minute is a formula for creating extreme stress and potentially adversely affecting your grade.

Case Study: Students will work individually on a project-like assignment in which the data is supplied to the student as well as the application scenario. The case study will be based on regression modelling. As with assignments, you are free to discuss the assignment with any of your classmates; however, your programming, interpretation, and write-up must be done independently and an individual's exclusive work.

Projects A and B: Teams of approximately 3 students will work on two projects during the course of the term. Each of the projects will focus on a different statistical model. Unlike with the case study, students will be responsible for finding or generating data for which it is appropriate to apply the statistical model for that project.

Project A will consist of applying both regression and ANOVA models to data found by the student team. Students working in teams of three will be responsible for generating a written report.

Project B will consist of a logistic regression model applied to data of interest. Students again will work in teams of 3 and be responsible for finding their own data. Each team will create presentation materials and give a class presentation.

In general, each project consists of finding a data set of interest, employing graphical methods for presenting the data, fitting and refining the appropriate statistical model, assessing the adequacy of the model, generating and running appropriate SAS code, and interpreting the results. Each project data set, to the best of your knowledge, should not have been previously analyzed in the way you plan to use it for your project.

Grade Complaints: Address your work in question first to the TA responsible for grading it (may be a different person for assignments and projects). Provide a **clear, brief, written explanation** of why you think you deserve additional credit. The written statement must be provided **within one week** after the work is graded and available to the class in general. All grade disputes must be resolved by the last day of normal classes (before finals week).

Tentative Course Outline:

| Week of ... | Tuesday | Thursday | Assessment |
|-------------|--------------------------------------------------------|--------------------------------|---------------------------|
| Aug. 27 | Intro / Stat. Modeling | Simple Regression | |
| Sep. 3 | Transformations / Outliers | Regression Inference | |
| Sep. 10 | Multiple Regression | Multicollinearity / Subsets | Assignment 1 Due 9/13 |
| Sep. 17 | Predictor Selection | Categorical Coding / Bootstrap | Assignment 2 Due 9/20 |
| Sep. 24 | Bootstrap | One-Way ANOVA | |
| Oct. 1 | Post-Hoc Testing | Two-Way ANOVA | Case Study Due 10/4 |
| Oct. 8 | Multiple Comparisons | Reg w/Indicators | |
| Oct. 15 | ANCOVA | Logistic Regression | Assignment 3 Due 10/18 |
| Oct. 22 | Log. Reg. Inference | Project A Set-Up | |
| Oct. 29 | More Logistic Reg. | Project Day | Proj. A Due 11/1 |
| Nov. 5 | Multiple Logistic Reg. | Mult. Log. Reg. Assessment | Assignment 4 Due 11/8 |
| Nov. 12 | 2-Way Tables | Scoring Models | |
| Nov. 19 | Validating Models | Project B Set-Up | Assignment 5 Due 11/22 |
| Nov. 26 | Project Day | Thanksgiving | |
| Dec. 3 | Proj. B Presentations | Proj. B Presentations | Proj. B Pres. 12/3 & 12/5 |
| Dec. 9 | Final Period: Monday 7:30 AM to 9:30 AM (if necessary) | | Proj. B Pres. 12/9 |

Certificate in SAS Programming and Data Analysis:

This course satisfies one of the four courses required for the SAS Programming and Data certificate jointly sponsored by FSU and the SAS Institute. **Students** interested in the program **must apply to the program before** the end of the semester in which **the second course in the program is taken**. In addition, a portfolio is required to be submitted in the last semester of program and a representative assignment and/or project from this course must be included. For more details see <http://stat.fsu.edu/sas-certificate>.

Liberal Studies for the 21st Century:

The Liberal Studies for the 21st Century Program at Florida State University builds an educational foundation that will enable FSU graduates to thrive both intellectually and materially and to support themselves, their families, and their communities through a broad and critical engagement with the world in which they live and work. Liberal Studies thus offers a transformative experience. This course has been approved as meeting the requirements for Scholarship in Practice and thus is designed to help you become a flexible thinker; a productive member of society; and an independent learner.

Academic Honor System: The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://fda.fsu.edu/Academics/Academic-Honor-Policy>.)

Americans with Disabilities Act: Students with disabilities needing academic accommodation should:

- (1) register with and provide documentation to the Student Disability Resource Center; and
- (2) bring a letter to the instructor indicating the need for accommodation and what type.

Please note that instructors are not allowed to provide classroom accommodation to a student until appropriate verification from the Student Disability Resource Center has been provided.

This syllabus and other class materials are available in alternative format upon request.

For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center
874 Traditions Way
108 Student Services Building
Florida State University
Tallahassee, FL 32306-4167
(850) 644-9566 (voice)
(850) 644-8504 (TDD)
sdrc@admin.fsu.edu
<http://www.disabilitycenter.fsu.edu/>

Syllabus Change Policy: Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.