**Course Information**
Advanced Data Analysis (STAT 448) is a very broad analytics course that aims to cover several topics in statistics and data science and to apply these methodologies in the Statistical Analysis System (SAS). The topics in the course include the following: descriptive statistics, data visualization, hypothesis testing, categorical data analysis, ANOVA, linear regression, logistic regression, generalized linear models, PCA, hierarchical cluster analysis, and discriminant analysis. SAS is an analytics program developed on the campus of North Carolina State University and is in use by several companies. This course aims to push students to investigate problems and employ aspects of the investigative process for data analysis.

**Section 1**
Mondays, Wednesdays & Fridays 2:00 pm - 2:50 pm   Foreign Language Bldg G27

**Course Website**
https://compass2g.illinois.edu/webapps/login/

**Instructor:** Christopher Kinson   kinson2@illinois.edu   Illini Hall Room 103A
**Instructor Office Hours** Tuesdays & Thursdays 4:00 pm - 6:00 pm

**Graders:** Firstname Lastname   netIDs@illinois.edu
**Grader Office Hours** By appointment only

**Prerequisites**
STAT 400 or STAT 409, and STAT 410 (or currently registered)
Familiarity with SAS is helpful, but not required.

**Disability Accommodations**
To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217-333-4603, e-mail disability@illinois.edu or go to the DRES website.

**Academic Integrity**
It is expected that all students abide by the campus regulations on academic integrity [http://studentcode.illinois.edu/article1_part4_1-401.html]. Intentional violations of academic integrity can be found at http://studentcode.illinois.edu/article1_part4_1-402.html and include, but are not limited to, copying any part of another student's homework, allowing another student to copy any part of your homework, or submitting a review or summary of a presentation not attended.

**Attendance, Technology, Outside Reading Material, Notes, Code, & Data Sets**
Students are expected to attend class daily. Please follow the Student Code https://studentcode.illinois.edu/docs/18.001.FullCodeInside.vf.pdf if you do have absences. Incomplete lecture notes, select SAS code solutions, and the data sets used in class will be

found in Compass. You will need to take notes in class in order to be successful. Additional coding guides or reading materials may be provided for learning outside of class. To store your data and save your work either bring removable media (e.g., flash drive) to the classroom or use cloud storage (e.g., Box, Dropbox, Google)

**Required Textbook**

A Handbook of Statistical Analyses using SAS, 3rd Edition by G. Der and B. S. Everitt.

**Recommended Textbooks**

- Learning SAS by Example: A Programmer's Guide by R. Cody

- SAS Statistics by Example (1st Edition) by R. Cody

**Required Software**

1. SAS Version 9.4, SAS Institute

    - can be purchased/downloaded from the University Webstore
    - free download of SAS for academic use - SAS University
    - free via the cloud - SAS OnDemand for Academics
        - Enroll in the SAS OnDemand course via this link and type the course code as **67d82b91-1abb-49fa-9090-d5a4fb052359**
    - free to use with UIUC login at the following computer labs:
        - (a) Scholarly Commons in the Main Library
        - (b) ATLAS in Foreign Language Building Room G8
        - (c) CITES in the Undergraduate Library (UGL)
        - (d) Academic Computing Facility at the ACES Library

2. Word processing software (e.g., Microsoft Word, Google Docs, Latex)

3. PDF reader

**Additional Resources**

1. SAS Version 9.4 Online Documentation

2. SAS Procedures By Name

3. SAS E-Learning materials from the University Webstore

**Tentative Weekly Schedule**

| Week | Topic | Items Due |
|---|---|---|
| 1 | Syllabus, How to Write HW Reports, and Ch. 1 Intro to SAS | |
| 2 | Ch. 2 Data Description and Simple Inference | Friday Lab |
| 3 | Ch. 3 Simple Inference for Categorical Data | Friday Lab |
| 4 | Ch. 4 Analysis of Variance I | HW 1 & Friday Lab |
| 5 | Ch. 5 Analysis of Variance II | Exam 1 |
| 6 | Chs. 6-7 Linear Regression | Friday Lab |
| 7 | Ch. 8 Logistic Regression | HW 2 & Friday Lab |
| 8 | Ch. 9 Generalized Linear Models | Friday Lab |
| 9 | Text Analysis | Exam 2 |
| 10 | Spring Break | |
| 11 | Ch. 18 Discriminant Function Analysis | HW 3 & Friday Lab |
| 12 | Classification Trees | Friday Lab |
| 13 | Ch. 17 Cluster Analysis | Friday Lab & |
| 14 | Ch. 16 Principal Components Analysis | HW 4 & Friday Lab |
| 15 | Ch. 19 Correspondence Analysis | Exam 3 |
| 16 | Final Project Q & A | |

*Important Dates:*
Spring Break - March 16 - 24, 2019 (no class and no office hours on these days)
Reading Day - Thursday, May 2, 2019 (no class on this day)

**Grading Breakdown**
Friday Labs: 30%
Homework Assignments: 25%
Exams: 15%
Proposal for Final Project Presentation: 7.5%
Final Project Presentation: 20%
Final Project Slides and SAS Code Submission: 2.5%

**Friday Labs**
Throughout the semester on Fridays (excluding exam days), students must complete lab assignments that are founded upon data analysis, the investigative process, and good communication. Students will be given the lab assignments during class and expected to complete the assignments in full during the Friday class period and submit them in Compass by the end of class (2:50 pm). The assignments will be graded based on analytical thoroughness, grammar, and overall quality. Feedback regarding the reports will be given over the weekend to help students think about the their approach when analyzing data. Late submissions will not be graded and will count as a 0. Students who are absent on Friday without an excuse but who submit the lab report on time will receive a penalty of a 25% deduction in their score (additional points may be deducted due to issues in the report). Students who are absent on Friday with an excuse but who submit the lab report on time will not receive a

penalty. The instructor ultimately decides which absences are considered excused as per the Student Code. There are no make-ups for missed Friday Lab assignments. These Friday Labs account for 30% of your final grade.

**Homework Assignments**
There are 4 assignments accounting for 25% of your final grade, and the single lowest assignment score will be dropped for undergraduate students. See the **Graduate vs Undergraduate Level Standards** section below for more details. When completing the assignment, read it carefully, and follow the directions part by part. You will have one file (written report file) to turn in for each homework assignment. Save your written report file (.pdf) with your name and homework assignment number (as in Sample HW Report). The written report file should contain your answers (in words) to the homework questions, which may also require code, plots, and tables as evidence to support your word answers.

For a student with UIUC NetID doe21 turning in Homework 4, their file would be saved as `HW4_doe21.pdf` (capitalizing does not matter). Make sure your homework is neat and readable, containing only relevant results and responses to the questions. You will upload your program file and report file in Compass. **You can submit your report file an unlimited number of times prior to the due date. We will grade the most recent submission so long as it is before the deadline.** You are expected to complete your homework individually since you are graded as an individual. There is nothing wrong with collaborating with peers to think through the homework problems. Questions about the grading should be directed to the instructor. **Students can dispute their grades or ask for points back up to one week after their original grade has been posted to Compass.** There is no make-up for missed homework.

**Exams**
There will be three exams each accounting for 5% of the final grade. They will take place in class and distributed on paper as written exams. The exams are roughly 4 weeks apart. There are 50 minutes allotted for each exam. See the tentative weekly schedule above for exam dates and the topics covered.

**Final Project Proposal and Report**
The focus of the final exam, which is a final project consisting of an oral presentation and corresponding slides and computer programming. The presentation will be a data blitz applying data analysis approaches we have covered during the semester. By a certain deadline, all students must submit a proposal for the final project, which includes a topic title, question(s) you want to answer, data set with description, and analysis technique(s). The analysis techniques could include topics covered beyond week 3. Submitting the proposal allows for feedback and guidance from the instructor about the student's ideas and overall direction. Final presentations will occur during the final exam period which is scheduled for 8-11 AM Monday May 6, 2019. Students are expected to upload their final slides and the associated code code by Monday May 6, 2019 11:59:59 PM in Compass. The proposal accounts for 7.5%, the presentation 20%, and the slides and SAS code submission 2.5% of the final grade. The **Late Submissions Policy** does apply to the proposals. Late submissions of slides and SAS code will not be accepted. More details about the final project will be

announced later in the semester.

**Graduate vs Undergraduate Level Standards**
Graduate students will have two distinct differences in standards of performance. The first is that graduate students taking this course do not get to drop any homework assignments. Undergraduate students taking this course will be allowed to drop their single lowest HW grade as mentioned in the **Homework Assignments** section above. The second is that graduate students taking this course are only allowed up to 1 day for the late submissions policy. In other words, graduate students are allowed to submit their assignments $(0, 24]$ hours after the deadline, thus receiving a 10% deduction, e.g., your maximum score is 90 out of 100 points. Undergraduate students are given up to 2 days as mentioned in the **Late Submissions Policy** section below.

**Late Submissions Policy**
Homework and final project proposals submitted up to 2 days after the deadline will be accepted but at an automatic percentage reduction. Your submission will then be graded which may result in additional point deductions due to errors in your solutions. If submitted:

- $(0, 24]$ hours after the deadline, you will receive a 10% deduction, e.g., your maximum score is 90 out of 100 points

- $(24, 48]$ hours after the deadline, you will receive a 20% deduction, e.g., your maximum score is 80 out of 100 points

- $(48, \infty)$ hours after the deadline, you will receive 100% deduction , e.g., your maximum score is 0 out of 100 points

The exceptions to this policy are outlined in the **Graduate vs Undergraduate Level Standards** section below.

**Final Grade Percentage & Letter Grade**

| Lower bound | Upper bound | Letter Grade |
|:-----------:|:-----------:|:------------:|
| 0.967 | 1.000 | A+ |
| 0.933 | 0.966 | A |
| 0.900 | 0.932 | A- |
| 0.867 | 0.899 | B+ |
| 0.833 | 0.866 | B |
| 0.800 | 0.832 | B- |
| 0.767 | 0.799 | C+ |
| 0.733 | 0.766 | C |
| 0.700 | 0.732 | C- |
| 0.667 | 0.699 | D+ |
| 0.633 | 0.666 | D |
| 0.600 | 0.632 | D- |
| 0.000 | 0.599 | F |

## Questions You May Have

If it's a general question that all students would benefit from, please ask it in class or post it in the Discussion Board on Compass. If it's more specific to your performance and learning, please send an email to the Instructor. All course emails should be sent from your official illinois.edu email address and contain a subject line which begins with "STAT 448" for quickest response.

## For Your Safety

We have been asked by Public Safety (https://police.illinois.edu/emergency-preparedness/run-hide-fight/) to share the following information in case of weather or security emergencies.

Emergency Response Recommendations
Video on Emergency Response

## Sexual Misconduct Policy and Reporting

The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX and Disability Office. In turn, an individual with the Title IX and Disability Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found at https://wecare.illinois.edu/resources/students/#confidential. Other information about resources and reporting is available at https://wecare.illinois.edu/.

## The Last Word

The instructor reserves the right to make any changes he considers academically advisable. Any changes will be announced in class and on Compass. It is your responsibility to attend the class and keep track of the proceedings.