

Course and Contact Information:

Spring 2022

STAT 6197 - Fundamentals of SAS Programming for Data Management
Section 80 CRN 37336

Building/Room: ROME B104
Fridays (12:45 PM - 3:15 PM)

Instructor:

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Office hours: Fridays (3:30 PM – 4:30 PM)

Course Description:

This course will introduce students to SAS programming for accessing, managing, manipulating, summarizing data, and controlling, modifying, aggregating, combining, and reshaping SAS data sets. The course will also cover the SAS macro facility and the main aspects of the Structured Query Language (SQL) and the Interactive Matrix Language (IML). The course will also cover selected SASPy module applications in Python sessions. Finally, we will explore the two-way exchange of data between SAS datasets and Python Pandas Data Frames and between SAS macro variables and Python objects, as well as basic data wrangling in Python.

Course Prerequisites:

This course is for students who intend to develop an appreciation for the inner workings of SAS. Formal prerequisites for the course include an introductory course in statistics (e.g., STAT 1051 or 1053), prior programming knowledge, or permission from the instructor. Familiarity with SAS is desired but not required; however, students cannot receive credit for STAT 4197 and STAT 6197.

Learning Outcomes:

After completing the course, students will be able to:

- read raw data and Microsoft Excel files into SAS data sets
- manipulate data using SAS expressions, functions, arrays, and Do Loops
- aggregate, combine, reshape and summarize data using DATA and PROC steps
- automate and customize the generation of SAS code using the macro facility
- manipulate matrices and SAS data sets using PROC IML
- run analytics with a Python interface to the SAS System in Jupyter notebooks

Textbooks, Materials, and Recommended Readings:

Delwiche L, and Slaughter S. The Little SAS Book: A Primer. 2019. Sixth Edition. Cary, NC: SAS Institute Inc. (Recommended)

Ottesen RA, Delwiche LD, and Slaughter SJ. 2020. *Exercises and Projects for The Little SAS Book*, Sixth Edition. Cary, NC: SAS Institute Inc. (Recommended)

Cody, R. *Cody's Data Cleaning Techniques Using SAS®*, Third Edition - March 2017 (Recommended)

SAS® 9.4 Language Reference: Concept, Sixth Edition ([Link](#))

Base SAS® 9.4 Procedures Guide, Seventh Edition ([Link](#))

SAS® 9.4 SQL Procedure User's Guide Fourth Edition ([Link](#))

SAS® 9.4 Macro Language: Reference Fifth Edition ([Link](#))

SAS/IML 14.3 User's Guide ([Link](#))

SASPy ([Link](#))

Schedules of Lectures and Assessments:

| Week | Date | Lecture Topic | Assessment |
|------|------------|--|--|
| 1 | 01/14/2022 | The SAS System: Concepts and Components | |
| 2 | 01/21/2022 | DATA Step: Reading Data and Creating Reports | Take-Home Assignment 1 Given |
| 3 | 02/28/2022 | Working with Formats/Informats and Transforming Data | |
| 4 | 02/04/2022 | Functions, Data Conversions, Do Loops, and Arrays | Quiz 1 |
| 5 | 02/11/2022 | Controlling and Managing SAS Data Sets | |
| 6 | 02/18/2022 | Aggregating Data and Combining SAS Data Sets (DATA Step vs. PROC SQL) | Take-Home Assignment 2 Given |
| 7 | 02/25/2022 | Exploring and Summarizing Data, and Generating Reports (Base SAS PROC Steps and ODS) | Quiz 2 |
| 8 | 03/04/2022 | | Midterm Exam |
| 9 | 03/11/2022 | SAS Macro Language Basics | Take-Home Assignment 1 Due |
| 10 | 03/25/2022 | Macro Functions and Working with Macros | |
| 11 | 04/01/2022 | Additional Topics on Macro Facility | Quiz 3 |
| 12 | 04/08/2022 | Matrix Operations and Functions in SAS/IML | Quiz 4/In-class Assignment, and Take-Home Assignment 2 Due |
| 13 | 04/15/2022 | Simulating Data with SAS and Calling R in a SAS/IML Session | Quiz 5/In-class Assignment (Optional) |
| 14 | 04/22/2022 | Applications of the SASPy Module Using JupyterLab | |
| 15 | 05/06/2022 | | Final Exam |

Note: According to University policy, the final exam will be given during the final exam period and not the last week of the semester. For details and complete policy, see provost.gwu.edu/administration-final-examinations-during-examination-period.

Average Minimum Amount of Out-of-Class or Independent Learning Expected Per Week:

In a 15-week semester, including exam week, students are expected to spend a minimum of 100 minutes in independent learning for every 50 minutes of direct instruction, for a minimum total of 2.5 hours per week (or 37.5 hours for the semester). This 3-credit course should include 2.5 hours of direct instruction and a minimum of 5 hours of independent learning, for a total of 7.5 hours per week. Students can find more information about GW's credit hour policy at:

provost.gwu.edu/policies-forms (webpage) or

provost.gwu.edu/files/downloads/Resources/Assignment-Credit-Hours-7-2016.pdf (form)

Grading:

For this course, there will be four quizzes/in-class assignments, two take-home assignments, and two exams – a total of eight assessments. In addition, there will be an optional additional quiz/in-class assignment, which students can take and drop the lowest score in quizzes and in-class assignments. The instructor will report scores for each assessment in points and compute the weighted average points with percentages based on the following weights:

| | |
|---|------|
| Four quizzes/in-class assignments (100 points each) | 20% |
| Take-home assignment 1 (100 points) | 10% |
| Take-home assignment 2 (100 points) | 10% |
| Midterm exam (100 points) | 30% |
| Final exam (100 points) | 30% |
| Total | 100% |

Students should not assume that the instructor will curve students' overall weighted average points to determine their final grades. The choice for the curving methods is entirely at the instructor's discretion if there is a need for curving.

The final letter grades for the course will be reported based on the following numerical ranges of weighted average points with percentages: A = 94-100%, A- = 90-93%, B+ = 87-89%, B = 83-86%, B- = 80-82%, C+ = 77-79%, C = 73-76%, C- = 70-72%, D+ = 67-69%, D = 63-66%, D- = 60-62% and F <60%. However, the instructor will have the discretion to make changes to the above cutoffs. Students showing hard work inside and outside the classroom and exemplary participation in class may be given some positive consideration in determining the final course grades. Students must agree to the above methods of assigning the final course grades. All grades are non-negotiable! An incomplete grade may only be given to students who pass the course and cannot complete it due to well-documented circumstances beyond their control. For additional information, please refer to: <http://bulletin.gwu.edu/university-regulations/#Gradincompletes>.

Class Policies:

- Homework assignments submitted after the deadlines may not be accepted for grading.
- There will be no make-up exams/tests or extra-credit assignments.
- Students must turn off their mobile devices and store them out of reach during class sessions and exams.

- The instructor's response to students' e-mails may take more than 24 hours.

Technology requirements:

1. Computer and other peripherals (webcam, speaker, headphone, etc.)
2. Internet connection: We will begin this semester virtually to allow a gradual and careful in-person return to campus. Students should be prepared to attend the class online using zoom <https://gwu-edu.zoom.us/meeting/92204218782>.
3. Blackboard: Lecture notes and the description of class assignments will be made available to students via Blackboard.
4. GitHub repository: Example SAS programs for each lecture session will be available in a private GitHub repository. After accepting the instructor's invitation to become members of the GitHub organization, students can access this repository.
5. SAS software: In the classroom, students can use SAS® software by logging in to computer workstations. However, the SAS License is available from the Instructional Technology Lab (ITL) free of charge to GWU students who have registered for this course and intend to install the software on their laptops. [Here is the link for the form](#), which they are required to complete online to request a link to download the SAS Software or a license update to their already installed SAS software. Students are required to install the software on their laptops before the first day of class.

In addition, students should also register for SAS OnDemand for Academics (ODA) for accessing SAS Studio via a web browser. To gain access to ODA, students need to register with SAS by creating a SAS profile (https://www.sas.com/en_us/software/on-demand-for-academics.html). Students will need to use SAS® ODA in the Jupyter Notebook for in-class assignments.

University Policies:

University policy on the observance of religious holidays

According to University policy, students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. For additional information, please refer to <https://provost.gwu.edu/policies-procedures-and-guidelines>.

Academic integrity code

Academic dishonesty is defined as cheating of any kind, including misrepresenting one's work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information. For details and complete code, see <https://studentconduct.gwu.edu/code-academic-integrity>.

Safety and security

If possible, the class should shelter in place in an emergency. However, if the class's building is affected, students should follow the evacuation procedures. After evacuation, they should seek shelter at a predetermined rendezvous location.

Disability Support Services (DSS)

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and coordinate reasonable accommodations. For additional information, please refer to: <http://qwired.gwu.edu/dss/>.

Mental Health Services 202-994-5300

The University Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include crisis and emergency mental health consultations, confidential assessments, counseling services (individual and small group), and referrals. See here for details: <http://qwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices>.