

THE GEORGE WASHINGTON UNIVERSITY
Department of Statistics
Syllabus

Course: STAT 6197 (Section 80 CRN 95482)
SAS Programming
Semester: Spring, 2024
Time: Fridays (12:45 - 3:15 PM)
Location: Rome Hall, Room B104

Instructor: Pradip K. Muhuri
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Office: Rome Hall, Room 760C
Office hours: Fridays 3:30 - 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 cover the SAS macro facility and the main aspects of the Structured Query Language (SQL) and the SAS/Interactive Matrix Language (IML). The course will also cover selected SASPy module applications in Python sessions, exploring the two-way data exchange between SAS data sets and Python Pandas Data Frames and briefly comparing data wrangling in SAS and Python.

Course Prerequisites: Introductory Statistics (e.g., STAT 1051 or STAT 1053), prior programming knowledge, or instructor's permission. However, students who have already received credit for STAT 4197 cannot receive credit for STAT 6197.

Learning Outcomes:

Upon successful completion of this 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 generating of SAS code using the macro facility,
- manipulate matrices and SAS data sets using PROC IML and
- run analytics with a Python interface to the SAS System in Jupyter notebooks.

Textbooks and Online SAS Documentation:

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

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

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

SAS/IML 14.3 User's Guide (https://documentation.sas.com/doc/en/pgmsascdc/9.4_3.3/imlug/titlepage.htm)

SASPy (<https://sassoftware.github.io/saspy/>)

Schedules of Lectures and Assessments:

Week	Date	Lecture Topic	Assessment
1	01/19/2024	The SAS System: Concepts and Components	
2	01/26/2024	DATA Step: Reading Data and Creating Reports	
3	02/02/2024	Working with Formats/Informats and Transforming Data	
4	02/09/2024	Functions, Data Conversions, Do Loops, and Arrays	Test 1
5	02/16/2024	Controlling and Managing SAS Data Sets	Take-Home Programming Assignment 1 Given
6	02/23/2024	Aggregating Data and Combining SAS Data Sets (DATA Step vs. PROC SQL)	
7	03/01/2024	Exploring and Summarizing Data and Generating Reports (Base SAS PROC Steps and ODS)	Test 2
8	03/08/2024		Midterm Exam
	03/15/2024	Spring Break	
9	03/22/2024	SAS Macro Language Basics	Take-Home Programming Assignment 1 Due Take-Home Programming Assignment 2 Given
10	03/29/2024	Macro Functions and Working with Macros	
11	04/05/2024	Additional Topics on Macro Facility	Test 3
12	04/12/2024	Matrix Operations and Functions in SAS/IML	Test 4 Take-Home Programming Assignment 2 Due
13	04/19/2024	SAS Programming Efficiency and Miscellaneous	Test 5 (Optional)
14	04/26/2024	Applications of the SASPy Module Using Jupyter Lab	
15	05/10/2024 (Tentative date)		Final Exam

Average Minimum Amount of Work Expected Per Week:

Students are expected to spend a minimum of 7.5 hours during the semester, including 2.5 hours of classroom instruction and 5 hours for out-of-class independent learning.

Grading Policy:

The course will have four tests (quizzes or programming exercises) (20%), two take-home programming assignments (20%), a midterm exam (30%), and a final exam (30%), resulting in eight assessments, not including an optional fifth test. The lowest test score will be dropped if students take all five tests. The overall weighted average points with percentages will be calculated using the weights for the assessment categories above.

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%. 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.

Class Policies:

- Students should attend all classes and engage fully in class activities.
- 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 during class sessions and exams.

Technology tools:

- Blackboard: Use lecture notes and the description of class assignments available from Blackboard.
- GitHub repository: Use example-SAS programs for each lecture session available from the instructor's private GitHub repository. Upon acceptance of the instructor's invitation to become members of the GitHub organization, students can access this remote repository.
- SAS software:

Option 1: Use SAS® in the windowing environment in GW classroom computers. No software installation is required.

Option 2: Use SAS® in the windowing environment in the GW virtual computer lab (<https://gwu.apporto.com/>). No software installation is required.

Option 3: Use SAS® in the windowing environment on your Windows laptop after requesting a SAS® software license from the GW Instructional Technology Lab (ITL) by submitting an online form (<https://it.gwu.edu/sas>) and then installing SAS on the Windows laptop based upon instructions you receive from ITL via email. Licensed SAS software is only installable on Windows laptops (not Mac laptops). If this option does not work for you, consider Options 1, 2, or 4 to use SAS software for this course.

Option 4: Use a free version of SAS called SAS OnDemand for Academics (ODA) in a cloud-based environment after creating a SAS profile (https://www.sas.com/en_us/software/on-demand-for-academics.html) and then registering for SAS ODA. No software installation is required.

University Policy on Observance of Religious Holidays:

Under 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. See "Religious Holidays" at <https://provost.gwu.edu/policies-procedures-and-guideline> for details.

Academic integrity code:

Academic integrity is integral to the educational process, and GW takes these matters very seriously. Violations of academic integrity are cheating of any kind, including misrepresenting their work, taking credit for the work of others without crediting them and without appropriate authorization, and fabricating information. More information is available from the Office of Academic Integrity at <https://studentconduct.gwu.edu/academic-integrity>. Contact information: rights@gwu.edu or 202-994-6757.

Safety and security:

In an emergency, call GWPB at 202-994-6111 or 911. For situation-specific actions, review the Emergency Response Handbook at <https://safety.gwu.edu/emergency-response-handbook>. Get Out, Hide Out, or Take Out in an active violent situation. Stay informed: <https://safety.gwu.edu/stay-informed>.

Disability Support Services (DSS):

Any student needing 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.

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. Student services include crisis and emergency mental health consultations, confidential assessments, counseling services (individual and small group), and referrals.