Tufts University, Friedman School of Nutrition Science and Policy

Introduction to SAS Programming
Fall 2015

Class Meetings:  
Tuesdays and Thursdays, 1:30-3:00 p.m., Sackler 510
Starting October 20th, 2015

Instructor(s):  
Gail Rogers: Gail.Rogers@Tufts.edu  (617) 556 3338

Office hours:  
Monday 3:00-4:30 pm JMHNRC 711 Washington St Rm: 901A

Graduate Credits:  
0.5 credit

Prerequisites:  
None

Course Description:  
This half-semester course will provide students with sufficient knowledge of how to obtain, manage, clean and prepare data in SAS for Windows. Emphasis will be placed on the basics of SAS programming and data manipulation. Upon completion, students should be able to use data in SAS and be familiar with the procedure steps required to import and export data, create SAS data sets, produce descriptive statistics, and clean and transform data in preparation for statistical analyses. In-class exercises and weekly homework assignments will allow students to acquire hands-on experience solving common SAS programming tasks.

Course Objectives:  
Upon completion, students should be able to:
1) Use SAS data and procedure steps to import and export data
2) Create and modify SAS data sets
3) Merge and append data
4) Use SAS functions and statements to summarize and define new variables
5) Produce descriptive statistics
6) Clean and transform data in preparation for statistical analyses

Texts or Materials:  

SAS software version 9.3 or higher. Tufts has a site license with SAS and students may install a copy on their laptop. Consult the front desk at HHSL Computer Lab on 5th floor for details or see https://it.tufts.edu/sw-sas to get more information on downloading and installing the software. A typical installation can take up to an hour or more so please also bring your AC cord.
Alternatively, students may also find SAS installed in the computers in the HHSL library and PHPD student lounge. Please note that SAS may not work equally well on all operation systems, check for the compatibility at: http://support.sas.com/supportos/list.
**Academic Conduct:** Each student is responsible for upholding the highest standards of academic integrity, as specified in the Friedman School’s Policies and Procedures manual (http://nutrition.tufts.edu/student/documents) and Tufts University policies (http://uss.tufts.edu/studentaffairs/judicialaffairs/Academic Integrity.pdf). It is the responsibility of each student to understand and comply with these standards, as violations will be sanctioned by penalties ranging from failure on an assignment and the course to dismissal from the school.

**Classroom Conduct:** Students must notify the course director in advance if you will be absent for the class. Also, inform the lecturer in charge if you decide to leave the class early. Students who miss the class are responsible for downloading and reviewing the lecture materials and exercises from the class.

**Assessment and Grading:** 6 homework assignments (weekly) 60%  
In-class programming exercises 10%  
Comprehensive final exam 30%

**Assignments and Submission Instructions:** Homework is due each Tuesday by class time (1:30 p.m.). Homework assignments shall be submitted in class or emailed to the instructor along with corresponding SAS code, logs, and output prior to the start of class. Assignments received after their deadline will not be accepted or graded unless an extension is approved in advance. Students who are unable to complete an assignment or exam on time for any reason should notify the instructor by email prior to the deadline, with a brief explanation for why the extension is needed.

**Accommodation of Disabilities:**  
Students with documented disabilities are entitled to academic accommodation appropriate to their needs. If you require accommodations for this course, please contact me confidentially prior to the end of the second week of classes.
**Course Schedule:**

* This schedule is subject to modification at the instructor’s discretion.

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Course Topics, Learning Objectives and Assignments

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Class # 1:  **(10/20)** Getting started with SAS, Gail Rogers, Sackler, 510

**Learning objectives:**
Upon completion of this week, students will be able to:
1) Open and run a basic SAS program
2) Properly document SAS programs
3) Understand the basic functions and options of the editor, log, output and results viewer windows
4) Use the contents procedure and basic print statements to explore data
5) Create Variable and value labels

**Preparation for class:**
*Chapter 1 of The Little SAS Book*

**Assignments for this week:**
*Assignment # 1 given*

Class # 2:  **(10/22)** Getting your data into SAS, Gail Rogers, Sackler 510

**Learning objectives:**
Upon completion of this week, students will be able to:
1) Open SAS, SPSS, and EXCEL files using libname, filename and engine statements
2) Use SAS procedures to import *.txt, *.csv, Excel and ACCESS data
3) Use SAS data step and input statements to read in complex *.txt files

**Preparation for class:**
*Chapter 2 of The Little SAS Book*

**Assignments for this week:**
*Continue assignment # 1*
Class # 3: (10/27) Working with your Data Part 1, Gail Rogers, Sackler 510

Learning objectives:
Upon completion of this class, students will be able to:
1) Create and redefine variables
2) Use selected SAS numeric and character functions
3) Convert data from character to numeric and numeric to character
4) Use SAS date functions and formats
5) Create formats and format libraries

Preparation for class:
Chapter 3 of The Little SAS Book

Assignments for this week:
Assignment # 1 is due
Assignment # 2 is given

Class # 4: (10/29) Working with Your Data Part 2, Gail Rogers, Sackler 510

Learning objectives:
Upon completion of this week, students will be able to:
1) Use If -then statements
2) Use simple do loops for iterative processing
3) Use simple arrays
4) Use the retain and sum statements

Preparation for class:
Continue reading chapter 3 of The Little SAS Book

Assignments for this week:
Continue assignment # 2

Class # 5: (11/3) Modifying and Combining SAS data sets, Gail Rogers, Sackler 510

Learning objectives:
Upon completion of this week, students will be able to:
1) Append SAS data sets
2) Merge SAS data sets (1:1, inner and outer joins)
3) Use the IN= operator to track observations
4) Create multiple SAS data sets using the output statement

Preparation for class:
Chapter 6 of The Little SAS Book
Assignments for this week:
Assignment # 2 is due
Assignment # 3 is given

Class # 6: (11/5) Transposing data, Gail Rogers, Sackler 510

Learning objectives:
Upon completion of this week, students will be able to:
1) Use the transpose procedure to convert data from long to wide and wide to long
2) Use data step procedure and SQL procedures to aggregate, separate and reshape data in preparation for data analysis

Preparation for class:
Continue reading Chapter 6 of The Little SAS Book.

Assignments for this week:
Continue assignment #3

Class # 7: (11/10) Simple Macros, Gail Rogers, Sackler 510

Learning objectives:
Upon completion of this week, students will be able to:
1) Use existing SAS macro variables
2) Create simple macros for repeated functions
3) Debug macro code

Preparation for class:
Chapter 7 of The Little SAS Book

Assignments for this week:
Assignment # 3 is due
Assignment # 4 is given
Class # 8: (11/12) Visualizing data with ODS graphs, Gail Rogers, Sackler 510

Learning objectives:
Upon completion of this week, students will be able to:
1) Use and understand the basics of Output Delivery System (ODS Graphics
2) Create scatterplots, box plots, histograms and series plots in SAS
3) Customize and save graphics output for use in other software packages

Preparation for class:
Chapter 8 of The Little SAS Book

Assignments for this week:
Continue Assignment # 4

Class # 9: (11/17) Basic Statistical Procedures, Gail Rogers, Sackler 510

Learning objectives:
Upon completion of this week, students will be able to:
1) Use the frequency, univariate, means and correlation procedures
2) Do simple statistical tests using the T-test, ANOVA and Regression procedures
3) Understand the output from the above procedures and how to customize output and save results in data steps as well as *.html, and *.rtf files

Preparation for class:
Chapter 9 of The Little SAS Book

Assignments for this week:
Assignment # 4 is due
Assignment # 5 is given

Class # 10: (11/19) Data Cleaning Basics, Gail Rogers, Sackler 510

Learning objectives:
Upon completion of this week, students will be able to:
1) Combine previous skills acquired this semester to examine data, detect outliers and data errors, correct, recode and document data changes.

Preparation for class:
none

Assignments for this week:
Continue assignment # 5

Class # 11: (11/24) Debugging programs and exporting data, Gail Rogers, Sackler 510
Learning objectives:
Upon completion of this week, students will be able to:
1) Export data and results to *.html, EXCEL, ACCESS and *.txt files
2) Understand common SAS errors and warnings and how fix them
3) Determine where programming errors are occurring

Preparation for class:
*Chapter 10 and 11 of The Little SAS Book*

Assignments for this week:
*Assignment # 5 is due*
*Assignment #6 is given*

Class # 12: *(12/1)* Common programming tasks and solutions, Gail Rogers, Sackler 510

Learning objectives:
Upon completion of this week, students will be able to:
1) Use SAS to address some common programming tasks that include summarization, grouping, and updating of existing SAS data.

Preparation for class:
*None*

Assignments for this week:
*Continue Assignment #6*

Class # 13: *(12/3)* Common programming tasks and solutions cont., Gail Rogers, Sackler 510

Learning objectives:
Upon completion of this week, students will be able to:
1) Use SAS to address some common programming tasks for data management archiving data.

Preparation for class:
*None*

Assignments for this week:
*Assignment #6 is due*