Introduction to SAS Programming for Population Health
Fall 2015

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Course website: http://www.learnuw.wisc.edu
Lecture: 9:30-10:55 Fridays
Computer Lab: 11:00-12:30 Fridays

The first two lectures/labs will be in Animal Science Building room 150.
All other lectures will be in Health Sciences Learning Center room 2121.

Office hours: Thursday afternoon by appointment

Course objective: The goal of this course is to introduce students to the use of the SAS programming language for the analysis of biomedical data. Students will learn to use the SAS environment on a PC, to write programs for reading and processing data and to perform basic statistical analyses.

Text: Delwiche, Lora D. and Slaughter, Susan J. The Little SAS Book, A Primer, 5th edition, SAS Publishing, 2012. The required readings for each quarter of the course are included in the syllabus. An electronic version of this text is available through Books24x7 at www.library.wisc.edu

Software: SAS 9.4 for Windows and Linux is available to students for free from the Campus Software Library. It may be used on any UW-owned or personally-owned devices (see SAS Student Software). SAS should also be available on most Windows machines on DoIT managed computer labs as it is now part of the standard set of software included on computers. All computers in HSLC 2121 will have SAS 9.4 installed. If you plan to use your own laptop for class, please have SAS 9.4 installed as well if you have a 64-bit Operating System (otherwise download SAS 9.3).

Labs and Homework Assignments: There will be 4 homework assignments and 6 lab assignments. Lab assignments are due at the end of lab session when they are assigned (via Learn@UW). Homework assignments are due at 9:30 AM Friday the week they are due. The importance of the assignments cannot be overemphasized. Much of your learning will take place while working on assignment problems. Homework assignments should be printed out, well organized and reasonably neat. Only essential SAS code and output should be turned in, and it must be accompanied by a written explanation of what the output shows.

Exams: There will be a midterm (closed book) and a take home final exam (open book). The final exam will be distributed at the end of lecture on 12/04 and a printed out copy will be due by 2:25 PM on Friday 12/18. Details on where to turn in the final exam will be announced at a later time.

Grading: The course grade will be based on attendance and participation in lectures and labs (13%), homework (36%), midterm (26%), and the final exam (25%). A: 93-100; AB: 88-93; B: 83-88; BC: 75-83. You need to be present during the weekly lecture/lab to receive participation points for each week (1% of total grade per week). Academic integrity is critical to the mission of this University and all students are expected to follow all UW rules of academic conduct.
Learning Objectives for PopHealth 451

Introduction to SAS Programming for Population Health

By the end of the course, students will be able to:
1. Create and execute SAS programs interactively using the SAS Windowing Environment.
2. Understand the structure of a SAS program (DATA and PROC steps).
3. Import data in various formats into SAS using the DATA step and Import Wizard.
4. Use SAS libraries to create and manage permanent SAS datasets and user-defined formats.
5. Recognize common SAS program errors and identify strategies for debugging SAS programs.
6. Create and modify data using procedural programming structures provided within the SAS DATA Step (e.g. Do, Do Until, Do While, If/Then/Else and Arrays).
7. Use SAS functions to create and/or manipulate variables in the preparation of analysis datasets.
8. Use PROC CONTENTS and PROC PRINT to explore SAS datasets.
9. Use PROC MEANS, PROC FREQ, and PROC REPORT to summarize information in SAS datasets.
10. Modify and merge datasets using SET and MERGE in the DATA step.
11. Interweave SAS procedures and data steps to manage and analyze research data.
12. Understand the basis of using Macros in SAS.
13. Use arrays to aide in dataset manipulation.
14. Understand how PROC SQL and PROC Dataset might aide in efficient programming.
15. Create new datasets using OUTPUT and PROC TRANSPOSE.
16. Perform basic statistical analyses with PROC UNIVARIATE, PROC FREQ, PROC MEANS, PROC TTEST and PROC REG.
17. Start to understand how coding decisions when modelling influence research in population health.
# Course Schedule for PopHealth 451
## Introduction to SAS Programming for Population Health
The order of topics to be covered and the corresponding sections of the Delwiche and Slaughter textbook (5th Edition) are given below. All homework assignments must be complete at the start of lecture in the week the assignment is due. Only homework will be graded.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Chapter(s)</th>
<th>Lab</th>
<th>HW</th>
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<tbody>
<tr>
<td>**9/4 (L1), **9/11 (L2), 9/18 (H1) Getting Data Into SAS (3 weeks)</td>
<td>1-2,6</td>
<td>L1-L2</td>
<td>H1</td>
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<tr>
<td>SAS Programs (DATA and PROC steps), Import wizard, concatenating, and merging data sets</td>
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<tr>
<td>Dataset manipulation (label, set, drop, keep, rename) PROC SORT, PROC CONTENTS, PROC PRINT, PROC DATASTEP</td>
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<tr>
<td>Required Reading: 1.1-1.13 (Overview of SAS), 2.1,2.3-2.6,2.10,2.15-2.19,2.21 (Getting Data into SAS), 4.1-4.6 (Basic SAS Procedures), 6.1-6.5,6.11-6.13 (Modifying/Combining SAS datasets)</td>
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<td>9/25 (L3), 10/2 (H3), 10/9 Programming to refine the dataset (3 weeks)</td>
<td>3-4,11</td>
<td>L3</td>
<td>H2</td>
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<td>Cleaning data, creation of categorical variables if-then statements, numerical operators do-loops, dates, labels, formats</td>
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<td>10/16 Midterm Exam (In-class: closed book)</td>
<td>9</td>
<td>L4-L6</td>
<td>H3</td>
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<td>10/23 (L4), 10/30 (L5), 11/6 (H3), 11/13 (L6) Programming for Analysis (4 weeks)</td>
<td>9</td>
<td>L4-L6</td>
<td>H3</td>
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<tr>
<td>PROC FREQ, PROC MEANS, PROC TTEST PROC CORR, PROC REG, Stratified analysis, confidence intervals and odds ratios</td>
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<td>Required Reading: 9.1-9.13 (Using Basic Statistical Procedures)</td>
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<tr>
<td>11/20 (H4), 11/27, 12/4, 12/11 (L7) Programming Tools (3 weeks)</td>
<td>3,7</td>
<td>L7</td>
<td>H4</td>
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<td>Thanksgiving Break -- no class Introduction to Macros, Arrays and ODS Output Overview of Advanced SAS Processing Skills, PROC SQL PROC RANK, PROC TRANSPOSE, PROC SURVEYSELECT</td>
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<td>Required Reading: 3.11-3.12 (Arrays/Shortcuts), 7.1-7.6, 7.8 (SAS Macro Facility)</td>
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<td>12/16 Wednesday: Open Lab for Final Exam (10am-1pm) 12/18 Take-Home Final Due (2:25 pm)</td>
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