SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF MINNESOTA

PUBH 6420, SECTION 1

Introduction to SAS Programming
Fall 2018 Course & Contact Information

COURSE & CONTACT INFORMATION

Credits: 1
Meeting Day(s): Monday
Meeting Time: 11:15-12:05
Meeting Place: Moos Tower 2-520

Instructor: Greg Grandits
Email: grand001@umn.edu
Office Phone: 612-626-9033
Office Hours: TBN
Office Location: TBN

COURSE DESCRIPTION

This class is an introduction to the use of the SAS programming language for analysis of biomedical data. After an introduction to the SAS environment on a PC, SAS will be used to write programs for reading and processing data, and for performing descriptive and statistical analysis.

COURSE PREREQUISITES

None

COURSE GOALS & OBJECTIVES

By the end of the course students will be able to write SAS programs for data management, presentation, and analysis.

- Create and run SAS programs in a PC environment
- Read raw data files in different formats and create SAS data sets
- Create new variables in the data step
- Use SAS procedures to summarize data numerically and graphically
- Annotate SAS output with titles, labels, and formats
- Work with SAS data sets: sort, subset, merge and re-format
- Use SAS procedures for statistical inference: Chi-square tests, T-Tests, ANOVA, regression
- Export SAS data and output to other computers and formats

METHODS OF INSTRUCTION AND WORK EXPECTATIONS

Class will consist of once per week lectures covering SAS programs contained on the Moodle site. Assignments will be done running SAS on a personal computer or computers on campus. A monitored computer lab will be available during select times in Mayo C381.

COURSE TEXT & READINGS

Required textbook: The Little SAS book, 5th edition by Delwiche and Slaughter.
Required software: SAS version 9.2 or higher. The SAS University Edition can be purchased for free at https://www.sas.com/en_us/software/university-edition.html

COURSE OUTLINE/WEEKLY SCHEDULE

Week	Topic	Readings	Activities/Assignments
Week 1 (Sep 10)	• **Introduction to SAS** o Structure and types of data o Rules for SAS statements o SAS environment on PC o Data-step and procedures o Running program, log and result windows	• **LSB: Chapter 1**	• **Practice assignment (not graded)**
Week 2 (Sep 17)	• **Reading data into SAS** o list input, comma and tab delimited data, data from Excel o column input, pointers and informats o PROC IMPORT o PROC CONTENTS and PROC PRINT	• **LSB: 2:1,3-8,12,14-17,21**	• **Assignment 1 given**
Week 3 (Sep 24)	• **Describing data (Part 1)** o PROC PRINT, MEANS, UNIVARIATE, SGPLOT o summary statistics and graphical displays for numeric data o controlling output generated using ODS	• **LSB: 4:1-3,5,10** • **LSB: 5:1-2,4** • **LSB: 8:1-9** • **LSB 9:1-3**	• **Assignment 1 due** • **Assignment 2 given**
Week 4 (Oct 1)	• **Describing Data (Part 2)** o PROC FREQ, SGPLOT, CORR, REG o summary statistics and graphical displays for categorical data o crosstabulations o correlation and simple regression o using ODS graphics o SAS options and comments	• **LSB: 4:12** • **LSB: 9:8-11**	
Week 5 (Oct 8)	• **Creating variables in the Data Step** o direct assignments o if-then-else statements o SAS functions o handling missing data	• **LSB: 3:1-6, 11-12**	• **Assignment 2 due** • **Assignment 3 given**

Week 6 (Oct 15)	• **Formatting output/working with dates** o PROC FORMAT o titles, labels, and format statements o working with dates	• **LSB: 3:8-9** • **LSB: 4:1,6-8**	•
Week 7 (Oct 22)	• **Working with SAS datasets** o Sub-setting and merging datasets o SET and MERGE statements o KEEP option and KEEP statement o WHERE statement o creating and using permanent SAS dataset o LIBNAME statement o PROC SORT	• **LSB: 2:18-21** • **LSB: 3:7** • **LSB 6:1,4,9-13**	• **Assignment 3 due** • **Assignment 4 given**
Week 8 (October 29)	• **In-class exam (open book and notes)**		
Week 9 (November 5)	• **Creating SAS datasets from procedures and making reports** o use of OUTPUT statement in procedures o ODS OUTPUT statement o making reports o PROC RANK to compute cutoffs for variables o PROC TABULATE for reports	• **LSB: 4:11,13-16** • **LSB: 5:3**	• **Assignment 4 due** • **Assignment 5 given**
Week 10 (November 12)	• **Restructuring SAS datasets** o creating multiple rows from single row datasets o creating single row from multiple row datasets o OUTPUT statement o frequency distributions for multiple responses	• **LSB: 3:10** • **LSB: 6:10,14-15**	
Week 11 (November 19)	• **Statistical Testing and Modeling (Part 1)** o Chi-square, T-Tests, ANOVA, non-parametric tests o reading frequency counts as raw data o PROC FREQ, TTEST, ANOVA, GLM, NPAR1WAY	• **LSB: 9:4-7,12-13**	• **Assignment 5 due** • **Assignment 6 given**

Week 12 (November 26)	• **Statistical Testing and Modeling (Part 2)** o modeling binary data, logistic regression o modeling continuous data, linear regression o time-to-event analysis	• **LSB: 9:10-12**	
Week 13 (December 3)	• **Introduction to SAS Macros** o Macro variables o Macros	• **LSB 7:1-8**	• **Assignment 6 due** • **Take home exam given**
Week 14 (December 10)	• **Special Topics (TBD)**	• **TBD**	• **Take home exam due**

SPH AND UNIVERSITY POLICIES & RESOURCES

The School of Public Health maintains up-to-date information about resources available to students, as well as formal course policies, on our website at www.sph.umn.edu/student-policies/. Students are expected to read and understand all policy information available at this link and are encouraged to make use of the resources available.

The University of Minnesota has official policies, including but not limited to the following:

- Grade definitions
- Scholastic dishonesty
- Makeup work for legitimate absences
- Student conduct code
- Sexual harassment, sexual assault, stalking and relationship violence
- Equity, diversity, equal employment opportunity, and affirmative action
- Disability services
- Academic freedom and responsibility

Resources available for students include:

- Confidential mental health services
- Disability accommodations
- Housing and financial instability resources
- Technology help
- Academic support

EVALUATION & GRADING

Total points will be assigned based on 2 exams and 6 assignments:

Exam 1 (in class): 20%
Exam 2 (take-home): 20%
Assignments: 60% (best 5 or 6 @ 12% each)

Grades will be assigned as follows based on total points:

88-100%:	A
75-87%:	B
65-74%:	C
< 65%:	No credit

Assignments are due at midnight of the due date. All assignments must be submitted electronically via the Moodle website. Assignments submitted up to 2-days late will receive 2/3 credit. After 2-days no credit will be given.

Evaluation/Grading Policy	Evaluation/Grading Policy Description
Scholastic Dishonesty, Plagiarism, Cheating, etc.	You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis (As defined in the Student Conduct Code). For additional information, please see https://z.umn.edu/dishonesty The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: https://z.umn.edu/integrity. If you have additional questions, please clarify with your instructor. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam. Indiana University offers a clear description of plagiarism and an online quiz to check your understanding (http://z.umn.edu/iuplagiarism).