

Here is How We Do It: Teaching SAS® at Community Colleges

Meili Xu
Ohlone College, Fremont, California, USA

Abstract

Data is everywhere today and SAS® skills are in high demand. Providing community college students with SAS® skills is extremely valuable in preparing them for real-world job positions. In this paper, we will describe our experiences and approaches to teaching SAS® at Ohlone College. With the presentation at the conference, we wish to share ideas and resources with other educators teaching SAS® so that we may all better train our students with strong SAS® skills to face the real world challenges.

Introduction

Community colleges serve close to half of the undergraduate students in the United States. They are diverse institutions that serve a wide variety of needs including many nontraditional students, from ages 13 to 80 years and education levels from elementary school to PhD, many of them are adults that are also working while enrolled in school. Today's digital world produces data everywhere. Mastering a programming language that can be used to manage and analyze data efficiently is an important asset for community college students. SAS® is the perfect example such a language. SAS® programming skills are in high demand. Providing students with strong SAS® skills is extremely valuable for those who are looking for a job or preparing to make a career change that involves data management or statistical analysis. SAS® courses and certificate programs offered as cross-reference between Biotechnology and Computer Science department at Ohlone College equip students with solid SAS® programming and data analysis skills and provide them many job opportunities. In this paper, we shall outline our teaching and learning SAS® experiences and describe what we do to help our students to enrich their job skills therefore realize their career dreams.



About Ohlone College

The Ohlone Community College District is a multi-campus single community college district located in the southern portion of the San Francisco Bay in California, USA. Ohlone College is an ethnically diverse institution that promotes innovation and continuous improvement in many departments and divisions. The College is named for the Native American population living in the area when Mission San Jose was founded. The main campus (Figure 1) is located in the City of Fremont that is just south of the historical Mission San Jose. Ohlone offers more than 180 degrees and academic programs and serves almost 17,000 students per year. Every year about 500 students transfer to four-year colleges and universities. Over 700 students graduate with degrees or earn vocational certificates every year. Ohlone College employs approximately 465 faculty and 220 support and management personnel.



Figure 1. Ohlone College Main Campus

SAS® Courses

Course No	Title	Objectives
BIOY 110	Introduction to SAS Programming	Basic SAS® programming skills
BIOY 111	Advanced SAS Programming	Advanced SAS® skills
CSCS 100	Prerequisite for the New SAS® Certification Exam	
CSCS 101	Basic SAS® Programming	Basic SAS® programming skills
CSCS 102	Advanced SAS® Programming	Advanced SAS® skills
CSCS 103	Statistical Programming Using SAS®	Statistical Programming Using SAS® skills

Figure 2. There are four cross-referenced SAS® courses developed by the effort of joined faculty teams from both the Biotechnology and Computer Science departments, which give our students solid SAS® skills and real world experience.

Base SAS® Certification

We have incorporated the Base certification into our programs at Ohlone College. At the end of BIOT/CS 143 Advanced SAS Programming course, students are prepared and guided to take the Base SAS® certification exam on site at Ohlone College main campus. This certification helps students build their resumes and gives them advantage during job interviews.



SAS® Application in Biotechnology

Course No	Title	Units
BIOY 112	Introduction to Biostatistics	3
BIOY 121	Biostatistics Careers	1
CBIO 111	Computing in Biotechnology	4
CBIO 112	Prerequisite for SAS® Programming	1
CBIO 141B	SAS® Graphing and ODS-OR	1
CBIO 141	Advanced SAS Programming OR	(1)
CBIO 113A	Data Analysis Using SAS®	(1)
		12.15

Figure 3. The Computer Applications in Biotechnology Certificate is one of many popular certificates offered at Ohlone College. This is a cross-discipline certificate program developed by Biotechnology and Computer Science department faculty. The SAS® courses are important part of this certificate program



Software

Students have two ways to gain access to SAS®. First, Ohlone College has a site licensed software for student's use. Second, students are encouraged to use SAS® OnDemand for Academics.

Resources for Student and Faculty

- <http://support.sas.com> for Knowledge, support, training, certification, software, community and event, papers, online documentation, bookstore, Certification, SAS® Global Academic Program, SAS® OnDemand, User Groups, Events, E-newsletters, Discussion Forums
- <http://lexjansen.com> for user group proceedings for local, regional, and global conferences including: SUGI and SGF, MWUG, PhUSE, PharmaSUG, PNWSUG, SCSUG, NESUG, SESUG, and WUSS.
- Listservs and Groups
- sascommunity.org
- SAS® Tech support
- The most recent edition of *The Little SAS® Book* by Dwelwick and Slaughter.
- The SAS® Certification course uses the *SAS® Certification Prep Guide: Base Programming for SAS® 9, Second Edition* by SAS® Press.
- Courses notes from the SAS® institute. SAS® content is constantly evolving and these lecture notes are updated accordingly.
- SAS® online documentation

Data Sources

Including real-life data in programming assignments and projects help students gain experience on reading and manipulating different types of data situations, which can help students make a smooth transition to work in a real world environment.

Here is just a short list of sources that are available publicly:

- Provided by SAS® institute with the course notes
- Government websites: Census Bureau, Centers for Disease Control, National Highway Traffic Safety Association for automobile crash data, Agency for Healthcare Research and Quality for more national health survey data
- Google it on Internet

Tips for Teaching SAS® at Community Colleges

1. Community college students have a wide spectrum of backgrounds. At Ohlone College, most students who are interested in taking the SAS® courses are from life science or computer science background. The ratio is usually half-half.
2. For the other more advance SAS® courses. Our teaching methods may vary. Peer-to-peer instruction approach is an effective way.
3. To encourage student to learn materials beyond classrooms, a number of research papers are assigned to students periodically for classroom group discussions and activities.
4. Throughout the semester, instructors sometimes provide students template SAS® code for complicated assignments and projects.
5. Weekly programming assignments are typically due within one week. A final group project with real-life application is given at the end of each semester.

Conclusions

SAS® is a powerful data management and statistical analysis software package. It is used extensively in health and medical research, academic, government and private sectors. SAS® skills are in high demand. Preparing community college students with solid SAS® programming and data analysis skills brings them many job opportunities. Since tuition rate is very low at community colleges, providing learning opportunities for this valuable skill at community colleges helps students get the best value. Changes are inevitable. It's not how you deal with the changes, but rather how you accept it. As technology evolves, it becomes increasingly important for community colleges to provide students opportunities to continue learning and updating their skills so our students and communities are prepared to face the evolving real world challenges. We hope this presentation has been informative and valuable, and it can play a valuable role in encouraging the teaching and learning of SAS® skills at community colleges.

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Contact Information

Your comments and questions are valued and encouraged.
Contact the author at:

Name: Meili Xu
Company: Ohlone College,
E-mail: mxu@ohlone.edu

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