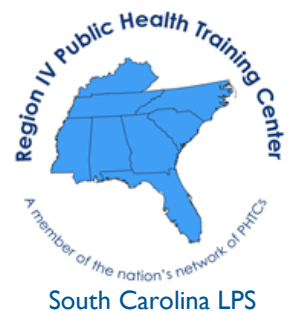# SUMMER INSTITUTE 2019

Workshops In Quantitative Research Methodology

Department of Public Health Sciences

Medical University of South Carolina

Charleston, South Carolina
May 1-10, 2019
www.musc.edu/dbe

MUSC
Medical University
of South Carolina

Region IV Public Health Training Center
A member of the nation's network of PHTCs
South Carolina LPS

The 2019 Summer Institute in the Department of Public Health Sciences at the Medical University of South Carolina (MUSC) offers several work-shops that introduce current quantitative methods used in key areas of public health, population health, and biomedical and clinical research, and offer hands on experience with implementing these methods. The targeted audience includes public health professionals, biostatisticians, epidemiologists, biomedical and clinical researchers as well as residents, post docs, fellows and graduate students.

May 1-2	Analysis of Zero Inflated Count and Semi-continuous Data
May 3	Fundamentals of Epidemiology: Population-Based Study Design & Analysis
May 3	Programming in R
May 6-7	Longitudinal and Multilevel Data Analysis
May 8-9	Developing Your Clinical Trial Toolbox
May 10	Introduction to Deep Learning Neural Networks with Applications in Bioinformatics

Analysis of Zero Inflated Count and Semi-continuous Data (May 1-2)

Day 1 AM—Continuous and Count Data

General linear models for continuous data (Gaussian, Gamma, log-normal)

Examples- systolic blood pressure, medical cost, life data (in proc GENMOD)

General linear models for count data (Poisson, Negative Binomial)

Overdispersion

Zero inflated data modeling using SAS

- Generalized Poisson model
- Two part or hurdle model (Poisson and negative binomial)
- Zero-inflated model (Poisson and negative binomial)

DAY 1 PM

Semi-continuous data modeling

Two-part model

Marginalized two-part model

Data examples: blood alcohol level data

DAY 2 AM—Longitudinal Data

Longitudinal zero-inflated count data modeling

- Two-part and Zero inflated (ZI) (GLMM ZIP, GLMM ZINB, GLMM TPP, GLMM TPNB)

Longitudinal semi-continuous data modeling

- Two-part and Marginalized Two-part (mTP)
- GLMM TPGamma, MTPGamma

DAY 2 PM– Missing Data

Methods for analysis of missing data in cross-sectional studies

- Simple methods
- Multiple imputation

Methods for analysis of missing data in longitudinal studies

Sensitivity analysis for MNAR data

Dr. Gebregziabher is Professor of Biostatistics in DPHS and a co-leader of the Biostatistics Core with the VA Health Services Research and Development funded Innovation Center for Health Equity and Rural Outreach. His research expertise is in longitudinal data, missing data, multiple outcomes research, and analysis of very large datasets. He collaborates in several areas of clinical & health services research related to T2DM, CKD, stroke, CVD, lung cancer and HIV/AIDS. He has over 100 peer-reviewed publications in top-tier biomedical journals and has developed/taught graduate courses on longitudinal data analysis, advanced regression, Bayesian analysis and Statistics in Epidemiology. He has served as President of Statistical Society of Ethiopians in North America, President of the South Carolina Chapter of the American Statistical Association and is currently Officer of the Statistics in Imaging Section.

Fundamentals of Epidemiology: Population-Based and Clinical Study Design and Analysis (May 3)

This one-day workshop includes four sessions: (1) The rationale for specific study designs, their advantages and disadvantages for different research questions and populations under study, and practical methods and pitfalls in designing and conducting valid clinical and population-based studies. (2) Modern causal thinking, reviewing theory and methods for assessing and controlling bias (selection bias, information bias, differential attrition, etc.) and assessing causality in randomized or observational studies. (3) Understanding sources of confounding in observational research, and way to assess and control confounding. (4) Theory and methods for assessing differential causal effects or interactions between causal factors, and an introduction to data analysis strategies and interpretation of results for different types of studies, including the basics of statistical approaches to analysis as well as an introduction to different types of multivariate modeling. Throughout the workshop students will be presented with concrete examples of appropriate methods, pitfalls to avoid, and fundamentals of causal thinking and interpretation of findings when designing, conducting, or evaluating clinical or population-based research studies.

Who Should Attend:

Clinicians and students having an interest in clinic-based and population-based study design and analysis, public health, and interpreting published literature.

Jeffrey E. Korte is Associate Professor of Epidemiology, and Graduate Training Director for Epidemiology in the Department of Public Health Sciences at MUSC. Dr. Korte has particular research interests in HIV, substance abuse, and women's health, with over 15 years of experience conducting epidemiologic research and collaborating with clinical and population-based scientists. In addition, he has over 10 years of experience teaching epidemiologic research methods to PhD and masters students at MUSC. The contents of this workshop are informed both by his teaching experience and his research experience.

Introduction to programming in R (May 3)

This one-day workshop includes two sessions. In the morning, participants will begin by learning the basics of R including how to install the program, navigate the interface, and general syntax for the language. In addition, by the end of the morning session participants will understand how to use basic functions to manipulate data, load packages, and perform basic analyses such as linear regression or t-tests. In the afternoon, skills from the morning session will be applied as participants work from generating exploratory graphics such as boxplots and histograms to the eventual production of reproducible publication quality graphics. During the workshop, participants will be provided with code examples and opportunities to practice with concrete examples and direct feedback.

Who Should Attend:

All researchers looking for a powerful free software to perform statistical analyses. Limited previous experience in a statistical language is required, though all participants should have access to a Windows laptop.
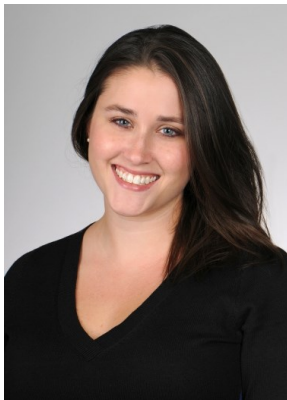
Caitlyn Ellerbe is an Assistant Professor of Biostatistics and Senior Biostatistician with The Data Coordination Unit (DCU), a statistical and data management center housed in the Department of Public Health Sciences. The DCU specializes in the design of clinical trials and analysis of their data and in establishing, implementing and maintaining data and project management systems for multicenter clinical trials. Dr. Ellerbe collaborates on the design and implementation of several large multicenter clinical trials with a focus on rare diseases, stroke, and other neurological emergencies. She publishes and presents on various topics related to the design and conduct of clinical trials, with a special emphasis on the design and conduct of adaptive clinical trials.

Longitudinal and Multilevel Modeling (May 6-7)

Frequently in medical research, data are collected longitudinally and/or in clusters. This workshop will focus on familiarizing the participants with the appropriate analyses for such data. Linear Mixed Models ANOVA (including random effects, fixed effects, nesting, repeated measures, missing data), Generalized Linear Mixed Models for analyzing categorical data and introduction to growth models will be presented. The workshop will be divided into three modules. Module I - multilevel data, Module II - longitudinal data, Module III—SAS software and hands-on experience in using SAS for topics covered in Modules I&II. *Module II requires participants to have SAS installed on their laptops. The Modules I and II will be presented on Day 1 and the Module III will be presented on Day 2.*

Who Should Attend: Clinical researchers, biostatisticians and students who have not been exposed to these topics.

Sharon Yeatts is an Associate Professor of Biostatistics in the Department. She collaborates with clinicians at MUSC and around the country in several health related topics, with a focus on neurological trials. She oversees design and biostatistical analyses of several multicenter longitudinal studies. She teaches regression and factorial analyses in the graduate program.

V. Ramakrishnan (Ramesh) is a Professor of Biostatistics in the Department. He has extensive experience in Multilevel and Longitudinal data methods. He has authored or coauthored methodological articles in several areas of biostatistics, including missing data, genetic epidemiology, longitudinal growth models, mixture normal models. He has developed and taught graduate courses on several topics including a course in longitudinal and multilevel data analyses.

Developing Your Clinical Trial Toolbox (May 8-9)

This workshop provides two sessions per day (8-noon and 1-5 each day) on aspects of clinical trial development and implementation for randomized clinical trials, and hands-on experience with the latest developments. Attendees have the opportunity to bring their specific trial questions to the course for discussion and feedback.

Day 1 Session 1:   Study Designs (aligning designs with objectives)

Day 1 Session II: Interim Analysis and Data and Safety Monitoring

Day 2 Session III: Conducting Design Simulation Studies

Day 2 Session IV: Practical Issues in Study Planning (budgets, form
                           development, dissemination)

Who Should Attend:

Clinical researchers, biostatisticians and students having an interest in clinical trial design and methodology.

Valerie Durkalski is Professor of Biostatistics and Director of The Data Coordination Unit (DCU), a statistical and data management center housed in the Department. The DCU specializes in the design of clinical trials and analysis of their data and in establishing, implementing and maintaining data and project management systems for multicenter clinical trials. Dr. Durkalski collaborates on several large multicenter clinical trials in various therapeutic areas, serves on several Data and Safety Monitoring Boards (DSMBs) and NIH peer-review panels. She publishes and presents on various topics related to the design and conduct of clinical trials and teaches 'Design & Conduct of Clinical Trials' to graduate students and healthcare professionals.
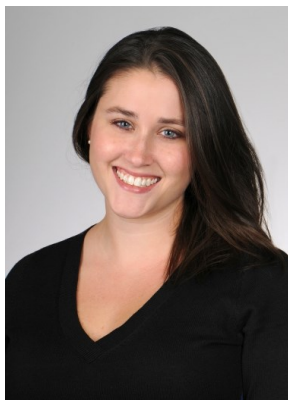
Caitlyn Ellerbe is an Assistant Professor of Biostatistics and Senior Biostatistician with the DCU, a statistical and data management center housed in the Department of Public Health Sciences. The DCU specializes in the design of clinical trials and analysis of their data and in establishing, implementing and maintaining data and project management systems for multicenter clinical trials. Dr. Ellerbe collaborates on the design and implementation of several large multicenter clinical trials with a focus on rare diseases, stroke, and other neurological emergencies. She publishes and presents on various topics related to the design and conduct of clinical trials, with a special emphasis on the design and conduct of adaptive clinical trials.

Introduction to Deep Learning Neural Networks with Applications in Bioinformatics (May 10)

This one-day workshop includes four sessions: (1) An introduction to deep learning methods with emphasis on the their respective advantages and disadvantages; (2) A practical session focused on setting up and troubleshooting a deep learning machine in an R environment, including: CUDA, Tensor flow and Keras on a GPU powered system; (3) Designing and training a Convolutional Neural Network for classifying histological images to detect differences in colonic specimens; (4) Generating features from text for deep learning and using them for training the models; (5) Evaluating your deep learning models.

Who Should Attend:
Clinicians and students who have an interest in the applications of Deep leaning methods in various biomedical fields. Attendees should be familiar with the R Software for Statistical Computing.

Ali S. Bakhtiari is Research Associate of Bioinformatics in the Department of Public Health Sciences at MUSC. Dr. Bakhtiari has particular research interests in the applications of machine learning methods in biomedical imaging. He has over 5 years of postdoctoral experience in biomedical fields and a track record of published works in the development of machine learning models. The contents of this workshop are informed by his ongoing research on imaging of colonic adenomas and carcinomas. .

Jihad S. Obeid, MD, is the Co-director of the Biomedical Informatics Center, Associate Professor and Division Leader of Biomedical Informatics. As co-director of the Biomedical Informatics Center, he oversees several academic and operational informatics initiatives. including the Research Data Warehouse, i2b2, REDCap, and several others. His research interests revolve around improving the translational research infrastructure using informatics tools, including deep learning applications for mining text in electronic health records.

VENUE

The courses will take place on the campus of the Medical University of South Carolina,

Recommended Area Accommodations:

Charleston Marriott Hotel
170 Lockwood Boulevard
Charleston, SC 29403
(843)723-3000/(800)968-3569
www.marriott.com/chsmc

Springhill Suites/Charleston Riverview
90 Ripley Point Drive
Charleston, SC 29407
(843) 266-8081
www.marriot.com/chssh

Comfort Inn
144 Bee Street
Charleston, SC 29401
(843)577-2224

The Courtyard by Marriott
35 Lockwood Drive
Charleston, SC 29401
(843) 722-7229
www.marriott.com/chscy

Inquire about an MUSC discount when making hotel reservations.
Additional information on Charleston and area hotel accommodations may be found at
www.charlestoncvb.com. Download a campus map at www.musc.edu.

General Daily Schedule:

Most classes start between 8:00 and 9:00am and end in the early evening between 5:00pm and 6:00pm

All classes will provide a catered box lunch. Please be sure to indicate on the registration form if you have any dietary restrictions.

Please contact the course director if a more specific scheduled is needed.

Summer Institute 2019

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Through Numbers to Knowledge
Through Knowledge to Health

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www.musc.edu/phs

Registration Deadline:

April 1, 2019

Refund Policy: Requests for refunds must be made in writing. There will be a $75 processing fee for cancellations made before the registration deadline. Following the registration deadline, no refunds can be given. The department reserves the right to cancel a workshop in which case a full refund will be granted.

Please notify us about special accommodations or dietary restrictions: _____

Registration Form:

Last Name: _____   *First Name:* _____

Institution: _____

Mailing Address: _____

City: _____   *State:*____   *Zip:* _____

Phone: _____   *E-mail:* _____

Registration Fee: $500 All other 2-day workshops; $300 1-day workshop

Clinical Trials Workshop—$150 per session ($500 for all 4)

○   *Zero-Inflated /Semi-Continuous Data (May 1-2)*

○   *Into to R Programming (May 3)*

○   *Fundamentals in Epi (May-3)*

○   *Longitudinal Analysis (May 6-7)*

○   *Clinical Trials (May 8-9) Specify Sessions:* _____

○   *Neural Networks (May 10)*

Total Amount: $_____

Payment can be made by phone or mail. Contact information is on the top left corner of this page. Registration fees are payable in U.S. dollars only. Personal checks are acceptable if payable through a U.S. bank.

Payment Method: o IIT (MUSC internal registrations only)

o Check (make payable to MUSC, DPHS)

o Visa   o Mastercard o American Express

Card #: _____   Exp Date: _____

Name on Card: _____

Authorized Signature: _____

Cardholder address: _____