BIOS 101 COURSE SYLLABUS

COURSE NAME: **BIOSTATISTICS 101 / BIOS 101 for Cancer Researchers**

LOCATION: Stabile Research Building, David Murphey Conference Room
(→***Note***: *February 7th the lecture will be held at the SRB Auditorium*)

CLASS DATES: Wednesday, January 10, 2018 – Wednesday, March 14, 2018

CLASS HOURS: **3:00 PM – 4:00 PM**

BACKGROUND	Understanding biostatistics is the foundation for cancer research. BIOSTATISTICS 101, BIOS 101, for Cancer Researchers at Moffitt is a diverse program presented in a 10 lecture series. The lectures introduce the basic principles of biostatistics and are intended for individuals who are in the process of learning biostatistical applications and/or for those who desire a refresher course.
COURSE DESCRIPTION	Descriptive statistics, hypothesis testing, correlation, statistical modeling, survival analyses, and clinical trials will be taught in this lecture series.
COURSE GOAL	The goal of this class is to introduce the basic statistical concepts and methods for cancer research.
WHO WILL TAKE THIS COURSE?	Clinicians, Fellows, Cancer Researchers, and Cancer Biology Students. ***Note**: Only Moffitt Members are eligible, and exceptional cases should be discussed with the Administrative Coordinator **prior** to the registration deadline.
COURSE PREREQUISITES	None
REGISTRATION POLICY	There is *not* a fee for this lecture series. However, attendees should be registered **by Friday, January 5, 2018** via e-mail to Bio2Admin@moffitt.org ***Note**: Only registered students can access course materials online.
COURSE FORMAT	The lecture materials (slides) will be posted before each class.
HOMEWORK	Each week there will be a homework assignment (5 questions) associated with each lecture which is due by midnight (EST) prior to the next lecture. **[To pass an assignment, a score of 60 or higher is required]**
CLASS CERTIFICATION	The class certification will be given to students who attend and pass the course. **[Attendance at 7 lectures with passing homework scores is required to receive the class certification].**
COURSE EVALUATION	At the end of <u>each</u> class, students are encouraged to complete a lecture evaluation form.

COURSE DIRECTOR	Y. Ann Chen, PhD Associate Member Department of Biostatistics and Bioinformatics Ann.Chen@moffitt.org Tel: (813) 745-6890	**COURSE ADMINISTRATIVE COORDINATOR**	Yanid Grullon Associate Grants Administrator Department of Biostatistics and Bioinformatics Bio2Admin@moffitt.org Tel: (813) 745-1134

FACULTY PROFILE

Name	Academic Rank/Position	Primary Research Focus
Farnoosh Abbas-Aghababazadeh, Ph.D.	Postdoctoral Fellow, Department of Biostatistics and Bioinformatics	Statistical analysis of omics data, linear and nonlinear mixed models, and multiple hypothesis testing
Dung-Tsa Chen, Ph.D.	Senior Member, Department of Biostatistics and Bioinformatics	Microarray data analysis, mixed models, survival data analysis, biomarker analysis, and clinical trials
Brooke Fridley, Ph.D.	Chair and Senior Member, Department of Biostatistics and Bioinformatics	Statistical Genomics, including analysis of genetic variants (GWAS), DNA methylation data and gene expression data measured via microarray or RNA-seq
Jongphil Kim, Ph.D.	Associate Member, Department of Biostatistics and Bioinformatics	Concordance analysis, survival analysis, clinical trials, and image analysis.
Youngchul Kim, Ph.D.	Assistant Member, Department of Biostatistics and Bioinformatics	Ribosome-footprint sequencing data analysis, microbiome data analysis, cancer biomarker discovery/validation
Richard Reich, Ph.D.	Biostatistics Core Facility Manager	Statistical analysis of longitudinal variables. Psychological research. Nursing research.
Michael Schell, Ph.D.	Senior Member, Department of Biostatistics and Bioinformatics Scientific Director, Biostatistics Shared Resource	Non-parametric regression analysis, practice of statistics, cancer research
Steve Sutton, Ph.D.	Assistant Member, Department of Biostatistics and Bioinformatics	Statistical analysis of patient-reported and behavioral variables in cancer prevention and quality of life studies
Xuefeng Wang, Ph.D.	Assistant Member, Department of Biostatistics and Bioinformatics	Statistical Genomics; Inferences for Generalized Linear Models; Computational methods for high-dimensional data

COURSE SCHEDULE / DESCRIPTION

Day/Date	Instructor	Contents	Goals
Wednesday 01/10/18 *Lecture #1*	Brooke Fridley, Ph.D.	Introduction	• Understand data types and variables • Descriptive statistics and graphical summaries • Understand the use of statistical distributions and assumptions
Wednesday 01/17/18 *Lecture #2*	Youngchul Kim, Ph.D.	Statistical Estimation	• Understand basic statistical inference • Point estimation • Confidence interval estimation
Wednesday 01/24/18 *Lecture #3*	Richard Reich, Ph.D.	Hypothesis testing	• Hypothesis testing • Type I/II errors • P-value and significance • Multiple Comparison
Wednesday 01/31/18 *Lecture #4*	Jongphil Kim, Ph.D.	Statistical Tests 1. Comparing two or more means/proportions 2. Measures of association	• Basic assumptions required for common statistical tests including the t-test, paired t-test, ANOVA, Chi-square test, Fisher's exact test, and the corresponding non-parametric tests. • Pearson and Spearman's Correlations
Wednesday 02/07/2018 *Lecture #5*	Michael Schell, Ph.D.	Laboratories and Experiments Basics	• Data Management • Transformations • Distribution • Small sample size issues
Wednesday 02/14/2018 *Lecture #6*	Xuefeng Wang, Ph.D.	Statistical modeling	• Linear regression • Logistic regression • Model building • Models for correlated observations • Model diagnosis and selection
Wednesday 02/21/2018 *Lecture #7*	Michael Schell, Ph.D.	Introduction to Clinical Trials	• Concepts of Phase I, II, III, and IV • Phase I trials: 3+3 design and model-based Bayesian designs • Phase II trials: Simon's two stage design
Wednesday 02/28/2018 *Lecture #8*	Dung-Tsa Chen, Ph.D.	Survival Analysis	• Kaplan-Meier curve with Log-rank test • Cox regression model
Wednesday 03/07/2018 *Lecture #9*	Steve Sutton, Ph. D.	Longitudinal Research	• Design and analysis issues in longitudinal studies using behavioral and patient-reported outcomes • Introduction to mixed models and generalized estimating equations • Modern missing data management techniques
Wednesday 03/14/18 *Lecture #10*	Farnoosh Abbas-Aghababazadeh, Ph.D.	Sample size and power estimation	• What is statistical power • Which factors have influence on the study power • How to estimate sample size and power • Online resources