BIOS 101 COURSE SYLLABUS

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

LOCATION: Stabile Research Building, David Murphey Conference Room

CLASS DATES: Wednesday, January 22, 2020 – Wednesday, April 8, 2020
                     No class week of March 18 due to USF Spring Break

CLASS HOURS: 2:00 PM – 3:00 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 an 11 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 GOAL	The goal of this class is to introduce the basic statistical concepts and methods for cancer research.
COURSE DESCRIPTION	Descriptive statistics, hypothesis testing, correlation, statistical modeling, power estimation, survival analyses, and clinical trials will be taught in this lecture series.
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 *no* fee for this lecture series. However, attendees should be registered **by Monday, January 20, 2020** via e-mail to Bio2Admin@moffitt.org ***Note**: Only registered students can access course materials online.
COURSE MATERIALS	The lecture materials (slides) will be posted before each class.
QUIZ	Each week there will be a quiz assignment (5 questions) associated with each lecture which is due by midnight (EST) prior to the next lecture. **[To pass a quiz, a score of 60 or higher is required].**
CLASS CERTIFICATION	**Seven lectures with passing quiz scores are 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 online.

COURSE DIRECTOR	Y. Ann Chen, PhD Associate Member Department of Biostatistics and Bioinformatics Ann.Chen@moffitt.org Tel: (813) 745-6890	**COURSE ADMINISTRATIVE COORDINATOR**	Paula Price Grants Administrator Department of Biostatistics and Bioinformatics Paula.Price@moffitt.org Tel: (813) 745-2646

FACULTY PROFILE

Name	Academic Rank/Position	Primary Research Focus
Naomi Brownstein, Ph.D.	Assistant Member, Department of Biostatistics and Bioinformatics	Behavioral applications, patient reported outcomes, health disparities, longitudinal data analysis, clusterability, survival analysis, missing data
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.
Y. Ann Chen, Ph.D.	Associate Member, Department of Biostatistics and Bioinformatics	Statistical modeling of omics integration and single cell analyses to predict clinical outcomes.
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.
Qianxing (Quincy) Mo, Ph.D.	Associate Member, Department of Biostatistics and Bioinformatics	Statistical methods for integrative analysis of multi-omics data; Microarray and next generation sequencing data analysis. Design and analysis of clinical trials and biological experiments.
Richard Reich, Ph.D.	Biostatistics and Bioinformatics Shared Resource Manager	Statistical analysis of longitudinal variables. Psychological research. Nursing research.
Michael Schell, Ph.D.	Senior Member, Department of Biostatistics and Bioinformatics	Non-parametric regression analysis, practice of statistics, cancer research.
Xuefeng Wang, Ph.D.	Assistant Member, Department of Biostatistics and Bioinformatics	Statistical Genomics; Inferences for Generalized Linear Models; Computational methods for high-dimensional data.
Christopher Wilson, Ph.D.	Postdoctoral Fellow, Department of Biostatistics and Bioinformatics	Statistical Genomics, Integrative analysis of multi-omics data, and computational methods for high-dimensional data.

COURSE SCHEDULE / DESCRIPTION

Day/Date	Instructor	Contents	Goals
Wednesday 01/22/2020 *Lecture #1*	Y. Ann Chen, Ph.D.	Introduction	• Understand data types and variables • Descriptive statistics and graphical summaries • Understand the use of statistical distributions and assumptions
Wednesday 01/29/2020 *Lecture #2*	Michael Schell, Ph.D.	Laboratory Basics and Experimental Design	• Data Management • Experimental design, randomization, confounding • Transformations • Small sample size issues
Wednesday 02/05/2020 *Lecture #3*	Youngchul Kim, Ph.D.	Statistical Estimation	• Understand basic statistical inference • Point estimation • Confidence interval estimation
Wednesday 02/12/2020 *Lecture#4*	Naomi Brownstein	Hypothesis Testing	• Hypothesis testing • Type I/II errors • P-value and significance • Multiple Comparison
Wednesday 02/19/2020 *Lecture #5*	Qianxing (Quincy) Mo, Ph.D.	Statistical Tests Comparing Two or More Means for Continuous Variables	• Basic assumptions required for common statistical tests including the t-test, paired t-test, ANOVA, and non-parametric tests
Wednesday 02/26/2020 *Lecture #6*	Jongphil Kim, Ph.D.	Categorical Analyses - Statistical Tests Comparing Two or More Proportions	• Categorical analyses: Chi-square test, Fisher's exact test, Measure of Effect, McNemar's test
Wednesday 03/04/2020 *Lecture #7*	Christopher Wilson, Ph.D.	Measures of Association & Simple Linear Regression	• Pearson and Spearman's Correlations • Simple Linear regression
Wednesday 03/11/2020 *Lecture #8*	Richard Reich, Ph.D.	Sample Size and Power Estimation	• Statistical power • Factors have influence on the statistical power • Estimate sample size and statistical power • Adjust for multiple testing • Online resources
Wednesday 03/25/2020 *Lecture #9*	Xuefeng Wang, Ph.D.	Statistical Modeling	• Multiple regression • Logistic regression • Model building • Models for correlated observations • Model diagnosis and selection
Wednesday 04/01/2020 *Lecture #10*	Dung-Tsa Chen, Ph.D.	Survival Analysis	• Kaplan-Meier curve with Log-rank test • Cox regression model
Wednesday 04/08/2020 *Lecture #11*	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