

COURSE SYLLABUS

COURSE NAME: **Omics Experience: Quantitative Science Short Course**

CLASS DATES: **May 27, 2025 – July 18, 2025**

LOCATION: **Web-based modules; Zoom meeting Mock Tumor Boards (*link included below*)**

CLASS HOURS: **Weeks 1-8: 1 hr./week online; Weeks 5-7: Thursdays 3:00 pm – 5:00 pm (Zoom)**

BACKGROUND	Quantitative sciences have become increasingly essential to cancer research. From designing clinical trials to analyzing complex molecular data, the need for quantitative thinking is an important skill for future scientists and clinicians. Technologies to probe genomes and their products have exploded in the past decade. Bioinformatics and computational biology play a role in cancer research and familiarity with concepts in these areas becomes important for hypothesis generation, target validation and discovery. This course provides an overview of the basic principles of biostatistics and genomic data analysis, including analytical techniques involving DNA and gene sequences, gene mutations, gene expression and protein measurements. The lectures provide an overview of the topics and introduce key issues in experimental design and analytical strategies for these molecular types. In addition to the coursework, students will participate in a mock molecular tumor board. Participants will utilize their knowledge of public sequencing resources to evaluate hypothetical cancer patients with specific genomic alterations in their tumors. This course is designed for students with limited previous exposure to biostatistics and bioinformatics, but with a willingness to learn.
COURSE DESCRIPTION	Biostatistics techniques include descriptive statistics and hypothesis testing. Bioinformatics analysis techniques, including derivation of analytical variables from raw signal, descriptive methods and hypothesis testing in large dimensional studies will be presented. The basic concepts, issues and applications of these analysis techniques will be introduced. Examples using website tools will be used.
COURSE GOAL	The goal of this class is to introduce the basic concepts of omics and its use in oncology and cancer research: <ol style="list-style-type: none"> 1. Evolution of genetics and genomics research. 2. The role of genomics in the future (and present) of precision medicine. 3. Health disparities in precision medicine. 4. New omics technologies in cancer research and applications to oncology. 5. Familiarize students with data-based, validated sources/tools of related information (ClinVar, OncoKB, cBioportal).
COURSE FORMAT	<p>Lectures (<i>weeks 1-8</i>): The course will consist of pre-recorded lectures and online questions to assess understanding of content. The material is designed to familiarize students with the concepts of precision medicine, genomics and other 'omics technologies with an emphasis in translational research and its application in clinical oncology. The lecture materials (recordings and slides) will be posted from the beginning of the course.</p> <p>Mock Molecular Tumor Boards (<i>weeks 5-7</i>): We will be holding mock molecular tumor boards for students to present a virtual case study. Students will present a patient, identify clinically relevant molecular alterations from 'omics results, and discuss the diagnostic, therapeutic and/or prognostic implications using publicly available resources. Students are expected to participate in the discussion of molecular test results and potential clinical implications.</p> <p>Note: Cameras are required during these virtual sessions to encourage discussions.</p>
WHO WILL TAKE THIS COURSE?	PHSU and MCC/USF summer rotation students (Undergraduate, Graduate and Medical students)

COURSE PREREQUISITES	None		
HOMEWORK	<p>Lectures (weeks 1-8): After every lecture, there will be a quiz assignment (3 questions) that engages if the student understood the material. To pass a quiz, a score of 66 (2/3) or higher is required.</p> <p>Mock Molecular Tumor Boards (weeks 5-7): Each student is expected to present either disease characterization (epidemiological evaluation of disease, prevalence, outcomes) or mock cancer patient with defined genomic tumor alterations. Student groups will present the mock cancer patient. All students are expected to participate in the tumor board discussion regarding clinical options and outcomes. Student tumor board slides are due the Tuesday of the tumor board presentation.</p>		
CLASS CERTIFICATION	The class certification will be given to students who successfully pass 6 or more quiz assignments and complete a presentation at a mock tumor board.		
COURSE WEBSITE	<p>We will be using a course website (https://phsu-mcc.moffitt.org/moodle) to manage the course information. Please check this website for updated information on office hours, links to lectures, FAQs and other communications.</p> <p>Please follow registration instructions provided by Yairí Rivera-Torgerson.</p>		
MOCK TUMOR BOARD LOCATION	<p>Remote course attendance</p> <p>Zoom link: https://moffitt.zoom.us/j/8137452682</p> <p>Password: 448505</p>		
OFFICE HOURS	<p>To help focus the presentation of mock cancer patients in the tumor boards, the course facilitators will be holding office hours to answer questions. Drs. Walko, Ho, and Teer (Mock Tumor Board Chairs) will hold virtual office hours during weeks 4 through 6 (June 16-July 4) for questions regarding their respective mock molecular tumor board. Please note this is one week prior to the tumor board, to allow time for modification of the patient presentations.</p> <p>Ms. Gordian (Tumor Board Facilitator) will be holding virtual office hours Monday, 11am-12pm during weeks 5 through 7 to go over the tumor board slides in detail with the students. This is an opportunity to work on detailed questions and/or get feedback on specific slides in your presentation. Please note the hours are scheduled such that students can get a final review of their presentation prior to submitting.</p> <p>Times will also be posted on course website.</p>		
COURSE CO-ORGANIZER	Christine Walko, PharmD Senior Member Department of Pathology Christine.Walko@moffitt.org Tel: (813) 745-1519	COURSE ADMINISTRATIVE COORDINATOR	Yairí Rivera-Torgerson PHSU-MCC Partnership Program Coordinator yairi.rivera-torgerson@moffitt.org Tel: (813) 745-2682
COURSE CO-ORGANIZER	Teresa Ho, PharmD Associate Member Department of Pathology Teresa.Ho@moffitt.org Tel: (813) 745-4444	MOCK TUMOR BOARD FACILITATOR	Edna Gordian, MA PHSU-MCC Partnership Data Concierge edna.gordian@moffitt.org
COURSE FACILITATORS	Steven Eschrich, PhD Luisa Morales Torres, DrPH Jamie Teer, PhD		

FACULTY PROFILE

Name	Academic Rank	Primary Research Focus
Christine Walko, PharmD Course Co-Organizer & Tumor Board Chair (Primary Glioma)	Senior Member Department of Pathology Moffitt Cancer Center	Precision Medicine, Genomics, Pharmacogenomics
Teresa Ho, PharmD Course Co-Organizer & Tumor Board Chair (Breast)	Associate Member Department of Pathology Moffitt Cancer Center	Precision Medicine, Pharmacogenomics
Steven Eschrich, PhD Course Facilitator	Senior Member Department of Biostatistics & Bioinformatics Moffitt Cancer Center	Translational Bioinformatics, Radiation Oncology, Informatics
Luisa Morales Torres, DrPH Course Facilitator	Associate Professor School of Public Health Ponce Health Sciences University	Biostatistics, Epidemiology
Jamie Teer, PhD Course Facilitator & Tumor Board Chair (Colon)	Senior Member Department of Biostatistics & Bioinformatics Moffitt Cancer Center	Massively Parallel Sequencing, DNA Sequencing
TBD (Primary Glioma)		
Avan Armaghani	Associate Member Department of Breast Oncology Moffitt Cancer Center	Breast Cancer Medical Oncology, Breast Cancer Clinical Trials
Melissa Manuelli, MS, CGC Clinical Advisor (Breast)	Genetic Counselor Department of Genetics Moffitt Cancer Center	Genetic cancer risk
Dae Won Kim, MD Clinical Advisor (Colon)	Associate Member Department of Gastrointestinal Oncology Moffitt Cancer Center	Gastrointestinal cancer, immunotherapy, clinical trials

COURSE SCHEDULE/DESCRIPTION

Day/Date	Instructor	Contents	Goals
Course Intro Week 1 May 28 – 9:00 am	Christine Walko, PharmD	Course Overview	<ul style="list-style-type: none"> Overview of course
Mock Tumor Board (Example) Week 3 June 11 – 9:00 am	Christine Walko, PharmD	Mock tumor board instructions and example	<ul style="list-style-type: none"> Patients for mock tumor boards
Weekly Lectures			
Lecture #1 Week 1 May 27 – 30	Online	From the Human Genome Project to Precision Medicine	<ul style="list-style-type: none"> From the Human Genome Project to Precision Medicine https://videocast.nih.gov/watch=27871
Lecture #2 Week 2 June 2 – 6	Online	Using cBioPortal	<ul style="list-style-type: none"> Introduction to cBioPortal: https://www.youtube.com/watch?v=fPIAxH--cSo Mutation Details & Patient View https://www.youtube.com/watch?v=uJsp9kd2jlk
Lecture #3 Week 3 June 9 – 13	Jamie Teer, PhD	Next Generation Sequencing	<ul style="list-style-type: none"> Next-gen overview Alignments Capture approaches Interpreting mutations in the context of cancer
Lecture #4 Week 4 June 16 – 20	Teresa Ho, PharmD	Pharmacogenomics	<ul style="list-style-type: none"> Explain fundamental pharmacogenomic concepts Navigate available resources for clinical application of pharmacogenomic information Describe process for integrating pharmacogenomics into clinical practice
Lecture #5 Week 5 June 23 – 27	Anders Berglund, PhD	Public Data Sources, Visualization and Methylation	<ul style="list-style-type: none"> GEO, ArrayExpress, TCGA, TCGA tools, cBioPortal, GTEx and PanCancer Analysis
Lecture #6 Week 6 June 30 – July 4	Online – Eric Green, MD, PhD from NHGRI	Realities & Opportunities for Genomics in Addressing Health Disparities	<ul style="list-style-type: none"> Realities and Opportunities for Genomics in Addressing Health Disparities https://www.youtube.com/watch?v=Ily94A1isA
Lecture #7 Week 7 July 7 – 11	Ling Cen, PhD	RNASeq	<ul style="list-style-type: none"> Overview of the workflow Experimental design Data analytics Advanced applications
Lecture #8 Week 8 July 14 – 18	Paul Stewart, PhD	Proteomics & Metabolomics	<ul style="list-style-type: none"> Introduction to mass spectrometry-based omics Analysis techniques (Labeled vs. Label-free) Metabolomics
Mock Tumor Boards			
Mock Tumor Board #1 Week 5 – June 26	Christine Walko, PharmD	Primary Glioma	<ul style="list-style-type: none"> Lianel Rosario (<i>PsyD</i>) Jillian Baader (<i>MD</i>) Estefany Rivas (<i>MD</i>) Jamir Riffas (<i>UG</i>) Madison Matos (<i>UG</i>)
Mock Tumor Board #2 Week 6 – July 3	Teresa Ho, PharmD	Breast	<ul style="list-style-type: none"> Joel Orengo (<i>PhD</i>) Janangelis Lopez (<i>MD</i>) Melanie Miranda Flores (<i>MD</i>) Esther Irizarry Quintana (<i>UG</i>) Gabriela Castro Morales (<i>UG</i>)
Mock Tumor Board #3 Week 7 – July 10	Jamie Teer, PhD	Colon	<ul style="list-style-type: none"> Sonia Brickey (<i>MD</i>) Gustavo Alayon (<i>MD</i>) Lillianna Cwynar (<i>UG</i>) Nemesis Torres Rivera (<i>UG</i>) Zuliann Galarza (<i>UG</i>)