

# 2019 IMMID Workshop Series on Molecular and Translational Medicine

## Workshop 2

### Applications of Artificial Intelligence to Microbial Genomics in Health and Disease



DREXEL UNIVERSITY  
Institute for  
Molecular Medicine  
& Infectious Disease  
*College of Medicine*

October 22, 2019  
245 N. 15<sup>th</sup> Street  
Philadelphia, PA

#### **GENOMICS/BIOINFORMATICS & BACTERIAL PATHOGENESIS**

Presentations today will focus on topics and research related to the use of computational methods in microbiology.

#### **Organizer:**

Garth D. Ehrlich, PhD, Drexel University College of Medicine

9:00 AM *Introductory Remarks*

#### **Brian Wigdahl, PhD**

Professor and Chair, Department of Microbiology and Immunology  
Director, Institute for Molecular Medicine and Infectious Disease  
Drexel University College of Medicine, Philadelphia, PA

#### **Noreen M. Robertson, DMD**

Associate Vice Dean for Research  
Drexel University College of Medicine, Philadelphia, PA

#### **SESSION 1**

9:15 AM *Opening Remarks*

#### **Garth D. Ehrlich, PhD, FAAAS**

Professor, Department of Microbiology & Immunology  
Professor, Department of Otolaryngology – Head and Neck Surgery  
Executive Director, Center for Advanced Microbial Processing  
Executive Director, Center for Genomic Sciences  
Institute for Molecular Medicine and Infectious Disease  
Drexel University College of Medicine, Philadelphia, PA

Co-chairs: **Josh Mell, PhD**, and **Haley Majer**, PhD Candidate

- 9:20 AM **Joshua P. Earl, MS, PhD**  
Research Instructor (Assistant Professor – pending), Head of Bioinformatics, Center for Genomic Sciences, Institute for Molecular Medicine and Infectious Disease; Department of Microbiology and Immunology, Drexel University College of Medicine, Philadelphia, PA  
*Machine-learning approaches for the identification of bacterial virulence and tropism genes*
- 10:05 AM **Kevin Raible** (PhD candidate)  
Center for Genomic Sciences, Institute for Molecular Medicine and Infectious Disease; Department of Microbiology and Immunology, Drexel University College of Medicine  
*Implementing functional and comparative genomic techniques to clarify nontypeable Haemophilus influenzae's unclear status between commensal and pathogen*
- 10:20 AM **Sergei Pond, PhD**  
Professor, Evolutionary Genomics, Department of Biology, Temple University, Philadelphia, PA  
*Using molecular networks to understand the past, monitor the present, and predict the future of HIV-1 transmission*
- 11:10 AM **Amanda Platt** (PhD candidate)  
Center for Advanced Microbial Processing, Institute for Molecular Medicine and Infectious Disease; Department of Microbiology and Immunology, Drexel University College of Medicine  
*Engineering Ebony to understand the protein-protein interactions required for natural product biosynthesis*
- 11:25 AM **Gail Rosen, PhD**  
Associate Professor, Department of Electrical and Computer Engineering, College of Engineering, Drexel University, Philadelphia, PA  
*Learning important microbiome taxa and their relationships*

12:00 PM **Lunch**  
Lunch will be provided for all meeting attendees

## **SESSION 2**

1:00 PM *Opening Remarks*  
Co-chairs: **Amy Ma, PhD**, and **Kaytie Innamorati**, PhD Candidate

1:05 PM **Maayan Levy, PhD**  
Assistant Professor of Microbiology, Department of Microbiology, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA  
*Identifying new players at the host-microbiome interface*

- 2:00 PM **Donald C. Hall Jr.** (PhD Candidate)  
Center for Advanced Microbial Processing, Institute for Molecular Medicine and Infectious Diseases, Drexel University College of Medicine; and Department of Chemistry, Drexel University, Philadelphia, PA  
*In silico drug design: a pipeline method to develop RelA/RSH inhibitors*
- 2:25 PM **Zhengqiao Zhao** (PhD Candidate)  
Department of Electrical and Computer Engineering, College of Engineering, Drexel University, Philadelphia, PA  
*Learning, visualizing and exploring 16S rRNA structure using an attention-based deep neural network*
- 3:00 PM **Haley Majer** (PhD Candidate)  
Center for Advanced Microbial Processing, Institute for Molecular Medicine and Infectious Disease; Department of Microbiology and Immunology, Drexel University College of Medicine, Philadelphia, PA  
*Whole genome sequencing of Actinomycetes isolates reveals gene clusters that encode potent antibiotics*

3:20 PM **Break**  
Snack provided

### **SESSION 3**

3:45 PM *Opening Remarks*  
Co-chairs: **Joris Beld, PhD**, and **Kevin Raible**, PhD Candidate

- 3:50 PM **Kaytie Innamorati** (PhD Candidate)  
Molecular and Cell Biology and Genetics Graduate Program; Center for Genomic Sciences, Institute for Molecular Medicine and Infectious Diseases; Drexel University College of Medicine, Philadelphia, PA  
*Pangenomic analysis of Gardnerella vaginalis and Porphyromonas gingivalis reveal major insights into clade structure and virulence factor possession*
- 4:10 PM **Will Dampier, PhD**  
Assistant Professor, Molecular Virology & Translational Neuroscience, Institute for Molecular Medicine and Infectious Diseases; Department of Microbiology and Immunology; Drexel University College of Medicine, Philadelphia, PA  
*Deep learning by analogy: applying text and image processing techniques to sequence analysis*
- 4:55 PM **Kayla Socarras** (PhD candidate)  
Department of Microbiology and Immunology, Drexel University College of Medicine, Philadelphia, PA  
*Global species level characterization of tick borne diseases via MCSMRT full length 16s rRNA microbiome analysis*

5:10 PM **Danielle Piazza** (PhD candidate)

Molecular and Cell Biology and Genetics Graduate Program; Center for Genomic Sciences, Institute for Molecular Medicine and Infectious Diseases; Drexel University College of Medicine, Philadelphia, PA

*Detecting genetic events without genetics: direct visualization of genome-wide recombination in a pathogenic bacterium by optical mapping*

5:25 PM **Adjourn**