The VADA Program
Visual and Automated Disease Analytics Graduate Training Program

Tuesday Program – June 2nd 2020

Time	Activity/Topic	Zoom Link
8:30am – 9:00am PST / 10:30am – 11:00am CST	Open address and welcome – Drs. Lisa Lix and Pourang Irani	https://zoom.us/j/95612904559
9:00am – 10:30am PST / 11:00am – 12:30pm CST	Student rapid-fire research presentations	Group 1: https://zoom.us/j/99772109773 Group 2: https://zoom.us/j/96609708493 Group 3: https://zoom.us/j/94750737138?pwd=K1d4VDJJK3hWM0ZjR2ZZc0I0YS82Zz09 Group 4: https://zoom.us/j/93049721454?pwd=K09oU3JuMTMyVUxxb2RBY3VlZlQvdz09
10:30am – 12:00pm PST / 12:30pm – 2:00pm CST	Break	
12:00pm – 1:00pm PST / 2:00pm – 3:00pm CST	Visualizing the pandemic: comparing trajectories of COVID-19 across countries – Dr. Andriy Koval	https://zoom.us/j/98965322214
1:00pm – 2:00pm PST / 3:00pm – 4:00pm CST	Visual and analytical considerations for human genomics research - Drs. Britt Drögemöller and Galen Wright	https://zoom.us/j/94441960453

Wednesday Program – June 3rd 2020

Time	Activity/Topic	Zoom Link
8:30am – 10:30am PST / 10:30am – 12:30pm CST	Machine learning approaches for infectious diseases – Dr. Gyan Pokharel	https://zoom.us/j/96965046737
10:30am – 12:00pm PST / 12:30pm – 2:00pm CST	Break **Round Table Discussions 10:45am – 11:45am PST / 12:45pm – 1:45pm CST:**	• NCCID-infectious disease knowledge brokering for public health – Dr. Yoav Keynan https://zoom.us/j/97994810845 • A Primer on High Dimensional Propensity Scores – Dr. Amani Hamad https://zoom.us/j/94965141962
12:00pm – 2:00pm PST / 2:00pm – 4:00pm CST	Machine learning applications with omics data – Dr. Julie Chen	https://zoom.us/j/94146984666

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The VADA Program
Visual and Automated Disease Analytics Graduate Training Program

Thursday Program – June 4th 2020

Time	Activity/Topic	Zoom Link
8:30am – 9:30am PST / 10:30am – 11:30am	Research Project Management – Dr. Natalie Knox	https://zoom.us/j/95328047198
9:30am – 10:15am PST / 11:30am – 12:15pm CST	Effective CV Development – Harpreet Dade	
10:15am – 11:45am PST / 12:15pm – 1:45pm CST	Break **Round Table Discussions 10:30am-11:30am PST / 12:30pm – 1:30pm CST:**	• Statistical Quality Control Charts for Public Health Surveillance – Dr. Ridwan Sanusi https://zoom.us/j/98211378569 • Early Career Experiences - Dr. Razvan Romanescu https://zoom.us/j/92460864862
11:45am – 12:15pm PST / 1:45pm – 2:15pm CST	COVID-19 Analytics Session – Dr. Gary Van Domselaar	https://zoom.us/j/92748306140
12:15pm – 12:45pm PST / 2:15pm – 2:45pm CST	COVID-19 Analytics Session – Dr. Julien Arino	
12:45pm – 1:15pm PST / 2:45pm – 3:15pm CST	COVID-19 Analytics Session – Dr. Pourang Irani	
1:15pm – 1:45pm PST / 3:15 – 3:45pm CST	Closing remarks and presentation of awards – Drs. Lisa Lix and Pourang Irani	

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The VADA Program
Visual and Automated Disease Analytics Graduate Training Program

Session Descriptions and Speaker Biographies

Tuesday June 2nd

Visualizing the pandemic: comparing trajectories of COVID-19 across countries – Dr. Andriy Koval

Tuesday, June 2nd 2020 – 12:00pm – 1:00pm PST / 2:00pm – 3:00pm CST

Session Description: Wrangling and visualizing temporal data presents unique challenges to data analysists. This 1-hour workshop addresses the key tasks involved in exploration of timeseries and walks the participants through an applied example of obtaining COVID-19 mortality data from a live source (https://opendata.ecdc.europa.eu/covid19) using an Application Programming Interface (API), computing relative timelines and various temporal metrics for individual countries, and designing information displays for understanding global trends. Data and scripts are provided. Software requirements: R, RStudio, and tidyverse packages. Accompanying GitHub repository: https://github.com/andkov/vada-2020-summer-school

Bio: Andriy Koval is an Assistant Professor in the Department of Health Management and Informatics at the University of Central Florida in Orlando. Dr. Koval has degrees in Quantitative Methods (Ph.D., Vanderbilt), Psychology (M.A., MTSU) and Mass Communication (B.S., MTSU). His research combines longitudinal modeling, reproducible analytics and data visualization to study how people engage health systems and services over the course of their lives.

Visual and analytical considerations for human genomics research
Drs. Britt Drögemöller and Galen Wright

Tuesday June 2nd 2020 - 1:00pm – 2:00pm PST / 3:00pm – 4:00pm CST

Session description: Advances in genomic technologies and related analyses have allowed for the ability to uncover genetic variants that are associated with complex disease at an unprecedented rate. At the forefront of these developments has been the progress made by genome-wide association studies (GWAS) due to decreasing genotyping costs, and consequently, the ability to routinely study tens of thousands of patients. These approaches allow for systematic screening of the genome in an unbiased manner. This session will provide an overview of GWAS analyses – from the quality control steps to visualization and variant interpretation.

Bios: Dr. Britt Drögemöller joined the Department of Biochemistry & Medical Genetics at the University of Manitoba as an Assistant Professor in April 2020. Dr. Drögemöller's research uses genomic analyses to guide the development of novel treatment strategies that offer maximum benefit and minimal harm. This research is focused specifically on vulnerable and understudied

populations (e.g. pediatric and maternal populations) as therapeutic agents are often not designed and tested with these patients in mind.

Dr. Galen Wright is an Assistant Professor in the Department of Pharmacology & Therapeutics at the University of Manitoba, and a Principal Investigator in the Neuroscience Research Program at the Kleysen Institute for Advanced Medicine. His lab focuses on using bioinformatic analyses of large-scale genomic data to study DNA repair in the brain, as well as employing precision medicine approaches in neurological disorders. The results of these computational analyses are then used to inform downstream functional validation experiments.

Wednesday June 3rd 2020

Machine learning approaches for infectious diseases – Dr. Gyan Pokharel

Wednesday June 3rd

8:30am – 10:30am PST / 10:30am – 12:30pm CST

Session description: Machine learning has been essential to the success of many recent technologies, including autonomous vehicles, search engines, genomics, automated medical diagnosis, image recognition, and social network analysis, infectious disease outbreak prediction among many others.
In this short course, I will introduce machine learning approach on infectious disease outbreak prediction. In the first 30 minutes, I will warm up by introducing machine learning approach and its application. Another 30 minutes will be used to talk about the epidemic data, epidemic data generating models and the required R packages to generate and analyze such data. In the last hour of the course, we will work on the mathematics within the decision tree-based classification method and apply this method to the simulated and real infectious disease data. Finally, we will discuss on the prediction results obtained from the classification methods.

Bio: I am an Assistant Professor of Statistics in the Department of Mathematics and Statistics at the University of Winnipeg. Much of my recent works have been in the area of infectious disease modelling, but I am also interested in Bayesian and computational statistics, spatio-temporal modelling, statistical learning and Gaussian process emulation-based likelihood approximation. I mainly focus on the methodology development to analyze the big and complex infectious disease data. I am also an Adjunct Assistant Professor in the Department of Community Health Sciences at the University of Manitoba.

The VADA Program
Visual and Automated Disease Analytics
Graduate Training Program

NCCID-infectious disease knowledge brokering for public health – Dr. Yoav Keynan

Wednesday June 3rd - 10:45am – 11:45am PST / 12:45pm – 1:45pm CST

Dr. Keynan M.D, PhD, Associate Professor. Infectious Diseases and HIV clinician scientist in the Departments of Internal Medicine; Medical Microbiology &Infectious diseases and Community Health Sciences and scientific director of the NCCID. His international and local translational clinical research focuses on HIV and respiratory infections. He is leading point of care and serological assay validation and clinical trials for treatment of COVID-19.

The National Collaborating Centre at University of Manitoba employs a variety of methods to adapt knowledge translation for diverse public health audiences on the range of infectious diseases.

A Primer on High Dimensional Propensity Scores

Wednesday June 3rd - 10:45am – 11:45am PST / 12:45pm – 1:45pm CST

Session description: Unmeasured confounding is a threat to the validity of observational studies aiming to examine an exposure-outcome association from administrative databases. This is specifically problematic when studying drug effects since treatment assignment is not random and depends on factors that are often not recorded in administrative data. The high dimensional propensity score (HDPS) method proposes a computerized algorithm that scans databases to identify a large number of confounders and estimate a balancing score which is used to produce less-biased estimates of treatment effect. This session provides an introduction to why, where and how to use HDPS algorithm.

Bio: Dr. Amani Hamad is a postdoctoral fellow at the George & Fay Yee Centre for Healthcare Innovation at the University of Manitoba. She completed her PhD at the University of Manitoba in the College of Pharmacy in 2019. Dr. Hamad has expertise in pharmacoepidemiology, maternal-child health, and working with Manitoba's administrative health data. Her current research focuses on constructing family health histories using administrative databases, and to use these histories to predict the risk of chronic health conditions.

Machine learning applications with omics data – Dr. Julie Chen

Wednesday June 3rd - 12:00pm – 2:00pm PST / 2:00pm – 4:00pm CST

Session description: In this session, Julie will first introduce omics data generated molecular biological domain and the machine learning applications to tackle biological challenges. Examples from her past work and literature will be provided to give an understanding of application purposes. The second half of the session will be a ML tutorial, where students will put their skills developed from the VADA foundational course as well as the random forest algorithm learned from the morning session to practical use. The tutorial will involve analyses in R on an omics dataset to:

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1. Explore the given data through summary statistics and data visualization,
2. Adapt scripts with the 'randomForest' R package to address a biological question
3. Report model performance and visualize the top ranking features
4. Make predictions on new data with the model

We will wrap up the session with discussions on techniques and domain applications.

Bio: Dr. Julie Chih-yu Chen heads data Science within the bioinformatics section at the National Microbiology Laboratory, Public Health Agency of Canada. At work, she leads the ongoing learning of biological/omics data science, and applies Statistical and Machine Learning (ML) approaches to microbial omics datasets in tackling biological challenges. The interdisciplinary nature of her career path is largely shaped by her training in both Molecular Biology (MSc, UofT 2011) and Bioinformatics (PhD, UBC 2016) as well as collaborations with researchers in biological and computational fields. She won the 2019 CAMDA international data analytical challenge. With the interest in addressing biological challenges, her scientific contribution for the past 10 years typically involves examination of omics data for pre-processing, visualization and extraction of biological information using data science techniques for the challenge at hand.

Thursday June 4th 2020

Research Project Management - Dr. Natalie Knox

Thursday June 4th 2020 8:30am – 9:30am PST / 10:30am – 11:30am CST

Session description: Funding bodies now promote collaborative research embodying a multi-disciplinary approach where large research teams with diverse expertise are assembled and contributing to common research goals. The application of a research-based project management approach to small and large research projects can help maintain project scope and momentum, manage expectations, and promote clear communication among team members and stakeholders. In this session, participants will learn some basic project management concepts and practical approaches to establish strong project management practices in a research setting.

Bio: Dr. Natalie Knox is Head of the Computational Biology Unit within the Bioinformatics Section at the Public Health Agency of Canada's National Microbiology Laboratory and an adjunct professor in the Department of Medical Microbiology and Infectious Diseases at the University of Manitoba. Her research focuses on the application of microbial genomics and bioinformatics for infectious disease surveillance and detection. She also studies the gut microbiome's influence on health and disease particularly in immune-mediated inflammatory diseases.

Effective CV Development – Harpreet Dade

Thursday June 4th 9:30am – 10:15am PST / 11:30am – 12:15pm CST

Session description: This session will give you tools to create a tailored CV that will allow you to get closer to your job search goals. You will learn tips and strategies on formatting and content to develop a polished document.

The VADA Program
Visual and Automated Disease Analytics Graduate Training Program

Bio: Harpreet is an engaging and resourceful Career Development Practitioner who believes in empowering and collaborating with her clientele through respectful and meaningful interactions. Harpreet has over ten years of experience as a Career Developer working with a spectrum of clients ranging from new immigrants to Canada, post-secondary and international students, refugees, citizens of Canada, and those with special needs. She has hosted and organized over 200 workshops and seminars catering to career and education related needs of over 2500 clients.

What sets this Career Practitioner apart is her approach to individual branding strategy to each of her client's career ambitions based on perseverance, risk taking and commitment to career building and individual approach to successful business partnerships for successful careers. Her expertise includes program and curriculum development and implementation, cross-cultural communication valuing diversity, career planning, creating marketing tools (CVs, resumes, cover letters, letters of intent, and portfolios), and labor market awareness and personal branding preparation.

Statistical Quality Control Charts for Public Health Surveillance

June 4th 10:30am – 11:30am PST / 12:30pm – 1:30pm CST

Session Description: Traditionally, control charts are applied to monitor the variations in different industrial processes. However, in the past few decades, control charts have been widely applied in health-care monitoring. This presentation will review the past and current applications of statistical quality control charts in public-health surveillance, and discuss the pros and cons of the charting methods proposed in the health-care and public-health areas.

Bio: Ridwan A. Sanusi (PhD) is a post-doctoral fellow at the Centre for Healthcare Innovation, University of Manitoba. He completed his PhD in 2019 at City University of Hong Kong in the Department of Systems Engineering and Engineering Management. Prior to this, he completed undergraduate and Master's degrees in statistics. Dr. Sanusi has expertise in the area of statistical quality control methods. Currently, he is working on statistical methods for longitudinal analysis of administrative health data and patient-reported outcomes data.

Early Research Career Planning

June 4th 10:30am – 11:30am PST / 12:30pm – 1:30pm CST

Session Description: This roundtable discussion is an opportunity for you to ask questions, get feedback, and learn from others on subjects related to career decisions and next steps in your academic or work life. Topics that may be discussed include: the choice between academia and industry, how to choose a dissertation topic, what to look for in an advisor, the publishing process, and anything else you are curious about.

Bio: Dr. Razvan Romanescu is a Biostatistical Consultant & part-time Assistant Professor in the Department of Community Health Sciences at U of M. Dr. Romanescu's expertise lies in statistical genetics, data-driven modeling, and infectious disease modeling.

The VADA Program
Visual and Automated Disease Analytics Graduate Training Program

COVID-19 Analytics Sessions

June 4th 11:45am – 1:15pm PST / 1:45pm – 3:15pm CST

Session Description: Three VADA faculty members (Drs. Gary Van Domselaar, Julien Arino and Pourang Irani) will each present on their COVID-19 research and how that work is informed by their disciplinary perspective. Each session will be half an hour long.

Closing Remarks

June 4th 1:15pm – 2:15pm PST / 3:15pm – 3:45pm CST

Drs. Lisa Lix and Pourang Irani will provide some brief closing remarks and present student awards.