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Data Science Specialist Mathematical Modeler C-UHS

Competition #:817688
Job Title: Data Science Specialist Mathematical Modeler C-UHS
Job Category: Research
New Work Type: Full-Time Temporary
Positions Available:1
Union Affiliation:NU
Posted Date:24/01/18
Closing date:13/02/18
Salary Range:$34.60 - $43.25 per hour
Length of Temporary Assignment:1 year
FTE Assignment (Cas=0.000001):1.0

Please apply directly at:
http://www.recruitingsite.com/csbsites/stmichaels/JobDescription.asp?CategoryCode=14444&JobNumber=817688&JobTitle=DataScienceSpecialistMathematicalModelerCUHS

Our research lab in Mathematical Modeling for Program Science at the Centre for Urban Health Solutions, St. Michael's Hospital is looking for a **mathematical modeler (infectious disease transmission)**. Our lab develops data-driven mathematical models as experimental frameworks for the strategic design, implementation, monitoring, and evaluation of public health programs to control HIV/STI epidemics. We generate new, actionable knowledge in the service of HIV/STI prevention and care at a population-level. The research program is led by Dr. Sharmistha Mishra, in close collaboration with the HIV Clinical Prevention Unit and the Centre for excellence in Economic Analysis (CLEAR) at St. Michael's Hospital, and with investigators, community-based organizations, and public health programs across Canada and in the following countries: India, Kenya, Sierra Leone, Ukraine, and more recently – South Africa. We collaborate with investigators in Canada (in particular, the Center for Global Public Health, University of Manitoba); United States (Key Populations Program, Center for Public Health and Human Rights, Johns Hopkins University); and United Kingdom (Imperial College and Bristol University). Our lab members and collaborators are passionate about making a difference with their unique skills and perspectives within a diverse team, and are working together on what they love to do.

The primary role of this position will be to work on developing and calibrating mathematical / simulation models for epidemic projections and including economic analyses, to developing figures and data visualization approaches from simulations. The position will focus on a series of mathematical and health-economic modeling studies examining HIV transmission and combination HIV prevention in Sub-Saharan Africa and Ukraine.

Responsibilities include coding mathematical models, reading in data and writing outputs, writing model fitting algorithms, and running computationally-intensive simulations using SciNet or other distributed computing resources. Responsibilities include ensuring appropriate training of staff and students; and communicating with internal and external collaborators regularly. This position requires a deep understanding of probability distributions; numerical methods; compartmental and dynamical systems modeling; reproducible data science in general; and a desire to adapt industry best practices in scientific computing to an academic environment. The position involves self-directed learning and a desire to adapt new simulation and computing approaches relevant to research questions, and a motivation to help make mathematical modeling a transparent and inclusive process with knowledge-users. The position involves

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collaboration with communities and persons with lived experience, such as persons living with HIV; and with investigators, public health teams, and community members in low and middle-income countries and across socio-cultural contexts. The incumbent must be flexible to work beyond the job description at times as work demands. The position will involve some short-term travel to South Africa, and other low and middle-income countries where our wider team of collaborators and knowledge-users are based - for activities directly related to modeling projects, and for local capacity-building.

Duties and Responsibilities:

- Develop and adapt/modify mathematical models of HIV transmission: deterministic, stochastic, network; and individual or agent-based models
- Develop efficient programs, algorithms, or systems to reduce programming time for parameter sampling, model fitting (to data), and analyses
- Importing and exporting large sets of raw and synthetic data files for use in statistical analysis and machine learning
- Manipulate, transform, encrypt, and combine data from multiple data sets
- Perform analytical (counterfactual) simulation exercises using mathematical models
- Perform literature reviews supported by information specialists and epidemiologists, to identify model parameters
- Perform descriptive and exploratory statistical analysis of individual-level or aggregate-level data to parameterize transmission models
- Perform Bayesian inferential model fitting
- Prepare tables, figures, and reports for end-users, including clinicians, researchers, community-based organizations, public health decision-makers
- Validation of code and models to ensure algorithms are complete, reproducible, accurate and of high quality prior to analysis
- Maintain high quality coding practices, version control, and documentation of coding for reproducibility
- Efficiently identify and correct syntax and programming logic errors in all code.
- Communicate and liaise with research, policy, program, and community partners; including coordinating and chairing collaborator meetings
- Contribute to report and manuscript writing, knowledge translation products, grants, and ethics review board applications
- Train, mentor, and supervise students

Qualifications:

- A Master's degree in Mathematical Epidemiology, Physics, Applied Mathematics, Engineering, Epidemiology, Statistics, Computer Science, Ecology and/or related discipline
- At least 2-5 years' relevant experience in modeling dynamical systems and/or numerical methods
- Experience in mathematical modeling of infectious disease transmission, particularly of HIV/STI transmission, is an asset
- Experience with economic analyses / economic evaluations / health-economics an asset
- Must be fully proficient in the use of C/C++ and/or at least one scripting language (e.g. R, Python, Matlab)
- Must be able to manage computer programming activities and support analytic operations
- Experience in parallel programming
- Experience with distributed computing (e.g. Compute Canada / SciNet)
- Experience in Frequentist and Bayesian statistics, and likelihoods

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- Experience with machine-learning and data visualization an asset
- Experience in teaching methods (eg. modeling or scientific computing) an asset
- Record of publications reflecting experience in quantitative training to date

Other Skills:

- Extremely strong interpersonal skills
- Enjoys designing experiments via computer simulations, writing code, debugging, writing algorithms
- Very strong interest in using models to inform clinical and public health decision-making
- Ability to understand and interpret complex analysis plans
- Excellent verbal communication skills – especially in communicating modeling and complex analytics to a variety of knowledge-users, decision- and policy-makers, clinicians, scientists and students from various disciplines (quantitative and qualitative)
- Strong analytical skills, technical acumen
- Excellent written communication / documentation of code
- An aptitude for accuracy, reproducibility, details, and self-directed learning
- Excellent decision making and problem solving skills
- Demonstrated ability to work both independently and to work collaboratively with internal and external team members, and stakeholders
- Ability to multi-task, work accurately and effectively to deadlines; good self-assessment of timing of tasks and ability to set deadlines
- Superior organizational and time management skills to manage and prioritize workload
- Enjoys technical and analytic challenges and learning new approaches and topics

Relevant SMH/LKSKI Websites:

C-UHS: http://stmichaelshospitalresearch.ca/research-programs/urban-health-solutions/

Sharmistha Mishra: http://stmichaelshospitalresearch.ca/researchers/sharmistha-mishra/

CLEAR: http://www.hubresearch.ca/