

Opportunity Title: USDA-ARS SCINet Postdoctoral Fellowship in Machine Learning for Influenza A Virus Pandemic Prevention

Opportunity Reference Code: USDA-ARS-2022-0162



Organization U.S. Department of Agriculture (USDA)

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A complete application consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. All transcripts must be in English or include an official English translation. Click [here](#) for detailed information about acceptable transcripts.
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- Two educational or professional recommendations

All documents must be in English or include an official English translation.

Application Deadline 1/31/2023 5:00:00 PM Eastern Time Zone

Description ***Applications will be reviewed on a rolling-basis and this posting could close before the deadline.**

ARS Office/Lab and Location: A postdoctoral research opportunity is available with the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS), National Animal Disease Center, Virus and Prion Research Unit, located in Ames, Iowa. For an introduction to the Flu crew at the National Animal Disease Center, please see: <https://youtu.be/kOJy8tFTuil>

Research Project: The U.S. Department of Agriculture - Agricultural Research Service (USDA ARS) mission involves problem-solving research in the widely diverse food and agricultural areas encompassing plant production and protection; animal production and protection; natural resources and sustainable agricultural systems; and nutrition; food safety; and quality. The programs are conducted in 46 of the 50 States, Puerto Rico, and the U.S. Virgin Islands. For ARS to maintain its standing as a premier scientific organization, major investments in computing, networking, and storage infrastructure are required. Training in data and information management are integral to the integrity, security, and accessibility of research findings, results, and outcomes within the ARS research enterprise. Nearly 2000 scientists and support staff conduct research within the ARS research enterprise.

The SCINet/Big Data Research Participation Program of the USDA ARS offers research opportunities to motivated postdoctoral fellows interested in collaborating on agricultural-related problems at a range of spatial and temporal scales, from the genome to the continent, and sub-daily to evolutionary time scales. One of the goals of the SCINet Initiative is to develop and apply new technologies, including AI and machine learning, to help solve complex agricultural problems that also depend on collaboration across scientific disciplines and geographic locations. In addition, many of these technologies rely on the synthesis, integration, and analysis of large, diverse datasets that benefit from high performance computing clusters (HPC). The objective of this fellowship is to facilitate cross-disciplinary, cross-location research through collaborative research on problems of interest to each applicant and amenable to or required by the HPC environment. Training will be provided in specific AI, machine learning, deep learning, and statistical software needed for a fellow to use the HPC to analyze large datasets.

Under the guidance of a mentor, the participant will have the opportunity to investigate the evolutionary dynamics of influenza A virus (IAV) at human and swine interfaces. The participant will learn techniques in genomic epidemiology and machine learning to quantify drivers of IAV evolution in swine using data generated from coordinated active IAV surveillance in human and swine populations, along with public data from passive USDA IAV in swine surveillance. The studies will investigate the evolution of contemporary swine IAV and

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determine virus properties that confer greater capacity to infect and transmit in swine and identify viruses that may spillover and cause pandemics in humans.

Learning Objectives: The participant will learn HPC computing technologies and will help develop and co-lead ARS-wide workshops, resulting in a community of scientific practice on machine learning applications for zoonotic pathogen early warning systems and genomic epidemiology. The participant will have the opportunity to collaborate with multiple USDA ARS scientists and investigators within the University of Pennsylvania Center for Excellence in Influenza Research and Response (CEIRR) as part of the NIH NIAID CEIRR collaborative network (<https://www.ceirr-network.org/centers/penn-ceirr>). Scientists within this project maintain a comprehensive IAV research program including investigation of virulence mechanisms, vaccinology, immunology, and virus evolution. The participant will have the opportunity to attend local and/or national meetings and will be supported and encouraged to publish independent and collaborative research dealing with the evolution and pandemic potential of swine IAV.

USDA-ARS Contact: If you have questions about the nature of the research, please contact Tavis Anderson (tavis.anderson@usda.gov).

Anticipated Appointment Start Date: Start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for one year, but may be renewed upon recommendation of the mentor and ARS, and is contingent on the availability of funds.

Level of Participation: The appointment is full-time.

Participant Stipend: The participant(s) will receive a monthly stipend commensurate with educational level and experience. **A health insurance stipend supplement and travel/research allowance is offered. A relocation allowance is also available.**

Citizenship Requirements: This opportunity is available to U.S. citizens, Lawful Permanent Residents (LPR), and foreign nationals. Non-U.S. citizen applicants should refer to the [Guidelines for Non-U.S. Citizens Details page](#) of the program website for information about the valid immigration statuses that are acceptable for program participation.

ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and ARS. Participants do not become employees of USDA, ARS, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

Questions: Please visit our [Program Website](#). If you have additional questions about the application process please email USDA-ARS@ora.org and include the reference code for this opportunity.

Qualifications

The qualified candidate should have received a doctoral degree in one of the relevant fields listed below (e.g. Bioinformatics, Computational Biology, Computer Science, Engineering, Physical Sciences, Evolutionary Biology, Microbiology), or be currently pursuing the degree with completion by January 2023.









Preferred skills:

- Experience in bioinformatics, computational biology, or virology
- Proficiency in at least one programming language (e.g. python, R, bash, perl)
- Experience in multivariate statistical analyses, including generalized linear mixed models, generalized additive mixed models, or variants of these methods
- Strong oral and written communication skills
- Ability to effectively collaborate and work with others

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**Eligibility
Requirements**

- **Degree:** Doctoral Degree.
- **Discipline(s):**
 - **Computer, Information, and Data Sciences** (9 )
 - **Engineering** (27 )
 - **Life Health and Medical Sciences** (26 )
 - **Mathematics and Statistics** (11 )
 - **Other Non-S&E** (2 )
 - **Other Physical Sciences** (12 )
 - **Physics** (16 )
 - **Social and Behavioral Sciences** (4 )