Opportunity Title: USDA-ARS Summer Internship in Swine Virology Research
Opportunity Reference Code: USDA-ARS-2022-0133

Organization	U.S. Department of Agriculture (USDA)
Reference Code	USDA-ARS-2022-0133
How to Apply	***Connect with ORISE...on the GO!*** Download the new ORISE GO mobile app in the Apple App Store or Google Play Store to help you stay engaged, connected, and informed during your ORISE experience and beyond!

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	5/2/2022 3:00:00 PM Eastern Time Zone
Description	***Applications will be reviewed on a rolling-basis.***

ARS Office/Lab and Location: A research opportunity is available with the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS), located in Ames, Iowa.

The Agricultural Research Service (ARS) is the U.S. Department of Agriculture's chief scientific in-house research agency with a mission to find solutions to agricultural problems that affect Americans every day from field to table. ARS will deliver cutting-edge, scientific tools and innovative solutions for American farmers, producers, industry, and communities to support the nourishment and well-being of all people; sustain our nation's agroecosystems and natural resources; and ensure the economic competitiveness and excellence of our agriculture. The vision of the agency is to provide global leadership in agricultural discoveries through scientific excellence.

Research Project: **Establish a machine learning pipeline to efficiently evaluate the infection risk in livestock species through modeling respiratory viruses in pigs.**

Data mining and machine learning have significant potential to break new ground in understanding fundamental aspects of the host-pathogen relationship. When considering the vast number of endemic and emerging viruses, strains and subtypes, and narrowing that through prediction, validation in ex vivo organoid models, and identification of the virus and host factors involved

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in infectivity of the virus and susceptibility of the host will accelerate knowledge for future outbreak preparedness and intervention.

Based on successful prediction of human-infecting viruses and our extensive curation of livestock viromic and virological data, the Intern will develop a livestock-targeted prediction workflow, and upgrade it along with further improvement of the predictive matrix. The measurable benchmarks indicating the completion this objective are: (1) Establishment of a machine-learning model for virus infection-risk prediction with >80% accuracy in swine, (2) inter-species comparison of the spectrum of human-infecting viruses with those in swine, and (3) upgrading the prediction model with updated predictive matrices.

The process for quality control and categorization of overall and subgroup datasets with known species-specific virus-host relationships will be performed by the Intern for human-infection prediction.

Learning Objectives: Methodological procedures validated in this project will not only facilitate infection-risk prediction for respiratory viruses in swine, but also can be easily transferred to other domestic (and even wild) animal species given sufficient viromic data are available for model training. Therefore, we expect to establish a predictive pipeline for the One-Health initiative in emerging animal viral diseases.

The project assignment should provide the participant with an opportunity to receive hands-on experience that complements his/her educational and professional background and helps the participant gain knowledge in areas related to the mission. Collaborations have been established with a group with expertise in building machine learning models to discriminate human-infecting viruses based on the frequency of k-mers in the viral genomic sequences. This will aid the Intern in any machine learning aspects of this project beyond the mentors capabilities. Project activities assigned to the participant will be appropriate for an education and training program and will not include governmental functions such as, project, budget, or personnel management, or clerical responsibilities.

The Intern will create computational workflows that combine sequence data from new and previous experiments and will develop and improve methods to integrate datasets from different fields of study that are tested through real-time analysis of existing porcine and viral sequence samples. The datasets, results, and findings of this project will be disseminated through three major activities. This will allow the implementation of this collaborative endeavor to have a greater impact in both scientific/academic and social communities. (1) Make the workflows, methods, and software information readily accessible by both command line and graphical interfaces for researchers

seeking to perform computational analysis. (2) Project Data deposition into public databases, which include GitHub for code sharing, and NCBI SRA databases for transcriptomic datasets; (3) Conference/seminar presentations, class instruction, and journal publications.

Mentor(s): If you have questions about the nature of the research, please contact Laura Miller (laura.miller@usda.gov).

Anticipated Appointment Start Date: May 2022. Start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will be during the summer for 90 days.

Level of Participation: The appointment is full-time.

Participant Stipend: The participant(s) will receive a monthly stipend commensurate with educational level and experience.

Citizenship Requirements: This opportunity is available to U.S. citizens only.

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. After reading, if you have additional questions about the application process please email USDA-ARS@orau.org and include the reference code for this opportunity.

Qualifications	The qualified candidate should be currently pursuing a High School/GED degree in one of the relevant fields listed below.

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Currently pursuing a High School Diploma/GED.
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (1 👁)