**Opportunity Title:** USDA-ARS Computational Tools & Pipeline Development for Metagenomic Data Analysis Fellowship
**Opportunity Reference Code:** USDA-ARS-2022-0027

**Organization** U.S. Department of Agriculture (USDA)

**Reference Code** USDA-ARS-2022-0027

**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
- Transcripts – 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** 9/29/2023 3:00:00 PM Eastern Time Zone

**Description** ***Applications are reviewed on a rolling basis and this posting will remain open until filled.**

**ARS Office/Lab and Location:** Multiple postdoctoral research opportunities are available with the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS), National Animal Disease Center located in Ames, Iowa.

**Research Project:** The US 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 working on agricultural- and natural resource-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 computers (HPC). The objective 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 the HPC.

There are many concurrent metagenomics projects involving samples taken from plant, animal and environmental communities being investigated within USDA-ARS. Throughout the course of this

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research project, the participant will gain experience in developing a pipeline that uses high-performance computing clusters (HPC) to analyze metagenomic data from various samples in order to establish best practices and a toolkit for use across different agricultural sample types. Under the guidance of a mentor, participant activities will involve implementing and developing software pipelines to integrate analysis of metagenome samples being collected by several different projects to identify associations between metagenome composition and expected system outputs.

Collectively, the individual will play an active role in analysis of a metagenomic dataset and in developing the pipelines for analysis, establish a foundation for other scientists in ARS to analyze their own diverse datasets. The participant will also help develop and co-lead ARS training workshops to utilize the implemented software pipelines on SCINet resources and help organize the metagenome analysis community through tutorials and wikis. As a proof of principle application, the participant will use the completed pipeline to quantify differences in the fecal metagenomes of swine fed different feed additives, and under mentor guidance, serve as a lead author on the project for peer-reviewed publications.

For more information about ongoing research efforts, please visit https://www.ars.usda.gov/midwest-area/ames/nadc.

**Learning Objectives:** The participant will gain experience with development of software pipelines for metagenome analysis, implementing pipelines on high-performance computing (HPC) clusters and refining pipelines to work for different data sets. The participant will have the opportunity to collaborate with teams at the USDA-ARS, HPC research support core, and breeding software developers. The participant will have the opportunity to collaborate with multiple USDA-ARS scientists by integrating their own research topic questions, and writing collaborative scientific papers dealing with software development and implementation. The participant will present their results at national/international meetings involving researchers, microbiologists, and stakeholders. The participant will learn to lead individual projects within this scope; however, emphasis will also be placed on training, collaboration and workflow development.

**USDA-ARS Contact:** If you have questions about the nature of the research, please contact Crystal Loving (crystal.loving@usda.gov).

**Anticipated Appointment Start Date: As soon as a qualified candidate is identified.** The 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 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.

**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.

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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 ORISE.ARS.Midwest@orau.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.

Preferred skills:

- Experience with developing and implementing software on Unix and HPC using SLURM submission scheduling
- Proficiency in programming language(s): R/python/Java/C++
- Experience in computer science, engineering, bioinformatics or computational biology
- Experience with GitHub
- Experience with high throughput data analysis, phenotypic data and/or genomic data
- Strong computational and analytical skills
- Strong communication skills in speaking and documented writing ability
- Basic interest in agriculture research and development of approaches for data analysis of diverse sample types

## Eligibility Requirements

- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (4)
  - **Earth and Geosciences** (1)
  - **Environmental and Marine Sciences** (5)
  - **Life Health and Medical Sciences** (10)
  - **Mathematics and Statistics** (1)