

USGS 2022 STUDENT INTERNSHIP OPPORTUNITIES

The USGS has the following positions available for student applicants in Golden, CO, and Albuquerque, NM, through the Pathways Internship Program. To apply for these job opportunities, go to <https://www.usajobs.gov/> and search for the announcement number listed below which best matches your field of study (science or engineering) and student status (undergraduate or graduate):

- # [USGS-PATH-22-11354229-DE-MW](#), Physical Science Student Trainee (GS-03/04 UNDERGRADUATE STUDENTS)
- # [USGS-PATH-22-11364015-DE-MW](#) Physical Science Student Trainee (GS-05/07 GRADUATE STUDENTS)
- # [USGS-PATH-22-11354251-DE-MW](#), Civil Engineering Student Trainee (GS-05/07 GRADUATE STUDENTS)

The application window will open at 10 pm MST on February 1, 2022. These positions are very competitive and have an application limit, so please apply as soon as possible before the limit is reached or window closes on February 15, 2022.

We recommend that you go to USAJOBS.gov in advance to set up your account, create your online resume, and upload the required documents to your account. Then, when the application window opens, you'll have everything ready to go.

Required documents that *must* be uploaded to USAJOBS.gov by the application deadline include:

- **Current transcripts** showing proof of enrollment. Unofficial transcripts are acceptable.
- **Resume** indicating preferred project number and point-of-contact (POC) name (see below).

Project opportunities listed below are grouped by discipline and available in Golden, CO, unless otherwise noted. These positions provide direct exposure to high-visibility research and are ideal for learning new skills. Many opportunities request but **do not require** programming experience; those willing to learn programming are encouraged to apply. These project opportunities are also listed at: https://earthquake.usgs.gov/static/lfs/internships/USGS_internships_2022.pdf

Seismic Hazard, Engineering, & Risk

1. Conduct interviews and/or focus group assessments of user needs for equitable earthquake loss products. Will support conducting of interviews and will lead analysis. Coursework and/or experience with qualitative data collection and interview coding/analysis is desired. Experience with user-centered design is a plus. Keywords: user-centered design, seismic risk, qualitative research. (POCs: Sabine Loos, David Wald)
2. Collect, prepare, and perform exploratory data analysis regarding earthquake loss modeling, socioeconomic characteristics, and demographic characteristics on project to develop equitable earthquake loss products. Programming, spatial data analysis, and visualization experience (in R or Python) are desired. Basic statistics is a plus. Keywords: data analysis, seismic risk, user-centered design, visualization. (POCs: Sabine Loos, David Wald)
3. Collaborate with a multi-disciplinary team to develop web tools that help civil engineers (structural and geotechnical) use forecasts of earthquake ground shaking from the USGS National Seismic Hazard Model. Keywords: earthquake engineering, computer science. (POCs: Andrew Makdisi, Nicolas Luco)
4. Work with the USGS PAGER team in analyzing earthquake casualty and impact data and perform statistical analysis of impact data for PAGER calibration efforts. Keywords: data analysis, shaking and loss estimates, PAGER, programming (Python/Matlab preferred). (POC: Kishor Jaiswal, Davis Engler)

Seismic Source & Ground Motion Characterization

5. Assist in coding development of automating the processing of synthetic time series from dynamic rupture simulations of earthquake sources and forward models for wave-propagation of seismic waves. Keywords: programming, geophysics, simulations. (POC: Kyle Withers)

6. Help in better characterizing earthquake ground motions via testing several seismic directivity models in a probabilistic seismic hazard analysis framework. Keywords: programming, seismology, geophysics, statistics. (POC: Kyle Withers)
7. Help in aggregating subduction zone synthetic and empirical data from various earthquake ruptures to create a database of earthquake ground motions, for use in training a neural network towards better prediction of ground motions in megathrust faulting regimes. Keywords: data science, machine learning, seismic hazard. (POC: Kyle Withers)
8. Assist in compiling and analyzing earthquake ground motions. An initial area of focus for this work will be on recent observations from Puerto Rico. Keywords: data analysis, seismic hazard, seismology, programming (Python preferred). (POCs: Morgan Moschetti, Eric Thompson)
9. Assist in improving methods for automated ground-motion processing and analysis. Keywords: programming (Python), signal processing, time-series analysis, seismology. (POCs: Morgan Moschetti, Eric Thompson, James Smith)
10. Improving earthquake ground-motion predictions. Projects will depend on applicants' experience and may include regionalization of ground motions through unsupervised learning methods, exploring ground motion uncertainty through the nonergodic framework for seismic hazards, Gaussian process regressions, or other. Keywords: programming, seismic hazard, seismology. (POCs: Morgan Moschetti, Eric Thompson)
11. Help update the North American crustal database and assist in investigations of seismic crustal structure to study continental evolution, crustal composition, active tectonics, and crustal earthquakes. Tasks include identifying relevant past studies, updating the crustal database, and developing maps and a poster display of the seismic velocity structure of the crust and uppermost mantle for comparison with geologic and tectonic studies. Keywords: physical structure, tectonics, earthquakes, seismology. (POCs: Oliver Boyd, Walter Mooney)
12. Assist in high-resolution seismic imaging research for seismic hazards. Two primary efforts include: (1) seismic data processing and analysis of land streamer seismic reflection data, and 2) participation in deployment and maintenance of Smartsolo sensors as part of an ambient noise tomographic investigation. Basic understanding of seismic data processing steps required for completion of migrated stacked sections is required. Keywords: seismic reflection, data processing, time-series analysis, seismic hazard, field. (POC: William Stephenson)

Earthquake Monitoring & Data Analysis

13. Assist in the development of an earthquake slip model database of significant earthquakes worldwide. Compile and organize data from regional and teleseismic networks that observed past earthquakes and learn to use USGS tools for modeling fault slip. An interested candidate may also assist with geodetic (GPS) data processing. Familiarity with Python is preferred. Keywords: earthquakes, seismology, geodesy, programming (Python). (POCs: Dara Goldberg, Will Yeck)
14. Develop operational machine learning models to facilitate rapid characterization of earthquake sources. Some experience in earthquake characterization, machine learning, and python programming strongly preferred. Keywords: earthquakes, machine-learning, programming (Python). (POC: Will Yeck)
15. Assess magnitudes of small earthquakes and compare different magnitude types for these events in order to improve seismic catalogs and associated products (e.g., aftershock forecasts). Candidate may also be involved in magnitude computation and/or developing operational strategies for improving real-time magnitude

characterization. Experience processing seismic waveforms is strongly preferred. Keywords: seismology, earthquakes, magnitudes, data analysis (POCs: David Shelly, Will Yeck)

Landslide Hazards

16. Assist in the development of a computational framework to aggregate satellite-based vegetative reflectance data across burn areas in the western U.S. to quantify spatiotemporal trends in vegetative regrowth and explore how these trends can be related to the likelihood of post-fire debris flows in the years following wildfire. Experience with Python is required, and interest in learning to develop geospatial databases and conduct reproducible scientific analyses using cloud computing resources like Google Earth Engine are preferred. Fieldwork opportunities are also available for candidates who are interested. Keywords: wildfire, remote sensing, geospatial analyses, field. (POCs: Matthew A. Thomas, Jaime Kostelnik)
17. Compile geospatial data associated with post-fire debris flow location, size, and susceptibility. Perform topographic analysis and topographic differencing in watersheds where debris flows have occurred. Use data science approaches to delineate landslide extent and volume from geospatial data. Familiarity with ArcGIS (or similar) useful but not necessary, some experience in either Python, R, or Matlab necessary. Specific platform/language used can be flexible based on student's experience. Keywords: landslides, GIS, debris flows, topography, programming, data science. (POCs: Katy Barnhart, Francis Rengers)
18. Identify, compile, and analyze geospatial data describing values at risk (e.g., population density, road networks, building footprints, seasonal tourist locations, other critical infrastructure) in the context of landslide runout hazard from post-fire debris flows and tsunamigenic landslides. Work will involve compiling existing data sources, generating new data, and extending the attribute detail on all data sources. Additionally, the student will analyze the datasets in the context of recent landslide events. Familiarity with GIS tools, raster data formats, and vector data formats will be useful. Keywords: landslides, GIS, exposure. (POC: Katy Barnhart)
19. This project is focused on scraping and analyzing publicly available rainfall data near recently burned areas. The candidate would use data science approaches to help develop python code to pull rainfall data from the web using an API. Candidates with data science backgrounds and interest are strongly encouraged to apply. Experience with python is required. Experience with Linux and bash preferred. Keywords: data science, hydrology, programming. (POC: Francis Rengers)
20. Use ground-based lidar data to quantify grain size of sediment deposits and compare to on-site pebble counts. Lidar data processing and machine learning approaches would be used to compare field data with lidar data. Required skills include Matlab or python expertise and interest in fieldwork. Keywords: data science, sedimentology, lidar, field. (POCs: Francis Rengers, Katy Barnhart)

Geomagnetic Hazards

21. Assist the USGS Geomagnetism Group with geomagnetic and magnetotelluric data archiving at the IRIS Data Management Center (DMC). Programming and/or scripting experience required, with an emphasis on engineering, scientific, and mathematical applications. Required skills include familiarity with the Linux command line and attention to detail. Experience with seismology and/or electromagnetics, Matlab, Fortran, XML data format, and version control tools such as Git/Subversion, or familiarity with the IRIS DMC are a plus. Keywords: programming, geophysics, geomagnetism, data archiving. (POC: Krissy Lewis)
22. Assist the USGS Geomagnetism Group facilities manager with a variety of tasks related to operating and maintaining 14 geomagnetic observatories across the U.S. Duties include assisting with purchasing, preparing

statements of work for construction projects, materials selections, scheduling, market research, and cost estimates. Candidates should have strong problem-solving skills and desired experience with AutoCad and RS-Means software. Keywords: facilities, engineering, construction. (POC: Mark Nelson)

Software Development

23. Work with software development team on operational software and system implementation. Projects can include front end web applications using the Angular framework or development of cloud-based software and systems. Work is largely in Javascript/Typescript or Python. Experience with GitHub or similar tools, programming experience, and understanding of computing concepts are very helpful. Keywords: programming, web, cloud, software development. (POC: Lynda Lastowka)
24. Work with scientists and software development team to code and conduct detailed data analysis for new seismic algorithms and changes to existing seismic algorithms. The work includes producing graphical outputs for review of data solutions from multiple algorithm versions or sources, such as seismic event locations, magnitudes, and moment tensors. A general understanding of python and basic relational database queries is beneficial. Familiarity with Sci-Py, ObsPy, and basic seismology is a plus. Keywords: programming, seismology, software development. (POCs: Michelle Guy, Paul Earle)
25. Work with the National Earthquake Information Center (NEIC) and software development teams for maintaining and updating the USGS Slab2 code and models. Slab2 provides three-dimensional models of subducting plate geometries for global subduction zones. The models are commonly used in seismic, geodynamic, and tsunami modeling as well in several USGS hazard products. Tasks may include updating Slab2 code and plotting scripts, writing tests, CI/CD, and maintaining/updating the Slab2 database. Other opportunities include working on web forms, the AWS Cloud, and model improvement. Experience in coding/plotting with Python or GMT, and basic geophysical knowledge would be helpful. Keywords: Slab2, geophysics, software development. (POCs: Kirstie Haynie, Will Yeck, Lynda Lastowka)
26. Work with the National Seismic Hazard Mapping Project (NSHMP) team in developing and maintaining web services, web applications, and cloud infrastructure that help create hazard maps. Projects can include web applications using the Angular framework, web services using the Micronaut framework, and cloud infrastructure using the Cloud Development Kit in Amazon Web Services. Programming languages may include TypeScript/JavaScript, Java, Python, HTML, SCSS. Keywords: programming, web, cloud, software development. (POCs: Brandon Clayton, Peter Powers)

Seismic Instrumentation & Data Quality (Albuquerque, NM)

27. Work with the Albuquerque Seismological Laboratory (ASL) instrumentation group to install seismometers, and other geophysical measuring devices, as well as analyze the data of installed seismic sensors. Methods for improving noise performance and other quality factors will be investigated. Keywords: seismology, programming, instrumentation, data analysis. Location: Albuquerque. (POC: Robert Anthony)
28. Improve data quality analysis methods and assess data quality of seismic networks operated by the Albuquerque Seismological Laboratory (ASL). This will include developing tests, analyzing data, and programming algorithms to aid in data analysis. that will aid network operators in making operational decisions to improve data quality. Key words: seismology, programming, instrumentation, data analysis. Location: Albuquerque. (POC: Adam Ringler)