2024 USGS Earthquake Science Center Internship Program Announcement

Do you want to work as part of a federal science agency that researches and monitors earthquakes and faults? The U.S. Geological Survey Earthquake Science Center is recruiting a diverse cohort of interns to work on earthquake monitoring, research, and information technology in summer 2024.

Join us for an information session at 7 PM Pacific on Thursday February 8, 2024:

Click Zoom link
https://us02web.zoom.us/j/86355187841?pwd=T0EvTi9mbWpha kZOU2N0ZnYvcDhOZz09
Or use: Zoom Meeting ID: 863 5518 7841
Passcode: 020824
Or aim your camera at the QR code

At the information session, Earthquake Science Center staff will describe the paid student internship opportunities, provide advice for applying, and answer questions. We encourage students at 2-year and 4-year colleges and universities who are considering careers or degrees in earth science, computer science, mathematics, physics, engineering, information technology, or other related fields. Applications from students with any level of experience are encouraged, we hope to hire a diverse cohort of interns. Positions are mostly for the duration of the summer (12 weeks, full-time), but some may be longer term by transitioning to part-time in the fall. Start date is flexible, but ideally will be late May or early June 2024. Students will work from one of the Earthquake Science Center offices in Pasadena, California; Moffett Field/Menlo Park, California, Seattle, Washington, or Vancouver, Washington.

These intern positions will be filled via contracts to students and recent graduates. The pay is comparable to federal employee pay and we will discuss how the contracts will work during the info session. To apply, you will upload application material to a google site by 11:59pm Pacific time on February 16:

https://forms.gle/iU1a9726tnjsVTD29

Feel free to reach out via email esc_internships@usgs.gov with any questions or issues. To be eligible to apply, you must be at least 18 years old, have an appropriate work visa if you are not a U.S. citizen (generally a student visa alone will not make you eligible for this type of contract), **and** be currently enrolled in a degree program at a recognized educational institution, **or** a recent graduate (within two years of graduation). These internships will be initially for the summer of 2024, but may be eligible for extension if funding and need exist.

The internship opportunities are listed beginning on the next page. All positions are in USGS offices. If you would like to contact the potential mentor, find contact info here:
https://www.usgs.gov/centers/earthquake-science-center/employee-directory

Please send any questions to esc_internships@usgs.gov

https://www.usgs.gov/centers/earthquake-science-center

2024 Summer Internship Opportunities

1. **Seismic data and metadata.** Real-time earthquake data presents an important challenge regarding translating field deployment of seismic instrumentation and maintenance into digital metadata repositories that can be referenced to process earthquake data used in many USGS Products. Help the USGS Earthquake Monitoring Project manage seismic instrumentation metadata to ensure the timely and accurate delivery of earthquake data to the public while building database skills for your career. Skills: Basic skills in excel and entry of information into databases is useful but not required. Mentors: Lisa Schleicher, David Croker. Location: Moffett Field, CA; Menlo Park, CA.

2. **Induced Earthquakes.** The United States hosts both natural and human-induced earthquakes but distinguishing between them is difficult. Wastewater injection has been correlated to seismicity in some oil and gas basins. This project aims to investigate the processes of poroelasticity and fluid diffusion from injection wells to faults where known earthquakes have occurred. Skills: MATLAB (but not essential); Mentors: Margaret Glasgow, Elizabeth Cochran; Location: Moffett Field, CA; Pasadena, CA.

3. **Machine learning implementation for geological feature mapping.** We are working to improve our ability to map faults and other geologic features quickly and accurately in photographs and 3D topographic models using machine learning. Intern would implement machine learning algorithms and analyze data. Strong proficiency in Python with a focus on data analysis is needed. This is a great opportunity to work with a team of computer scientists and geologists to solve a big challenge in earthquake hazards. Skills: Python, data analysis, machine learning algorithms. Experience processing point cloud data a plus.; Mentors: Kate Scharer, Devin McPhillips, Zhiang Chen; Location: Pasadena, CA.

4. **Remote mapping for machine learning development.** We are using machine learning to map faults and other geologic features quickly and accurately in photographs and 3D topographic models. Intern would use geologic mapping techniques to create robust training data for the machine learning algorithms. This work involves identifying and annotating features such as faults and fractures in imagery and point clouds. Student will work with a team of computer scientists and geologists and expand their knowledge of earthquake hazards. Skills: Experience mapping in the field is required, and experience working with point clouds would be helpful. Mentors: Kate Scharer; Location: Pasadena, CA.

5. **Seismic monitoring network**. This will be a combined position offering opportunities to 1) participate in field work and 2) do in-office data analysis. Field work will entail working with USGS field technicians to travel to locations around northern California and maintain seismic stations, including construction of seismic stations, installation/calibration of scientific instrumentation following construction, or upgrading of existing stations to better mitigate against wildfire threats. In office analysis will be examining data from the Rangely Earthquake Control Experiment, in which the USGS injected water deep underground in western Colorado, with the intention of causing earthquakes. Intern will use a simple GUI to examine a unique data set where seismograms are stored as images. Intern will identify the arrival of seismic phases for earthquakes and subsequently use software to locate the earthquakes. Further analysis may include looking for faults within the earthquake and spatial and temporal patterns in the earthquake behavior. Skills: Some coding ability (Matlab/Python), drivers license, basic Linux knowledge, experience with hand tools a plus. Mentors: Justin Rubinstein, Jim Smith; Location: Menlo Park, CA; Moffett Field, CA.

6. **Data Visualization**. Develop web-friendly visualizations for a wide variety of crustal deformation (geodetic) data (displacement, satellite and/or strain) to guide earthquake response activities. Skills: experience with software for data visualization (e.g., GMT, Matlab, GIS, Python, or similar) and scripting (e.g., Linux shell, Python, or similar); Mentors: Jessica Murray, Sarah Minson, Katherine Guns, Andy Barbour; Location: Moffett Field, CA.

7. **"Did You Feel It?" Earthquake Data Analysis.** Assemble DYFI data on earthquakes occurring in the Pacific Northwest since 1999 (when DYFI was inaugurated) and compare this data with other measures of seismological interest. These may include shallow seismic structure parameters and instrumental ground motions. Goals are to establish (likely) correlations between DYFI intensity data and shallow earth structure, with the possibility of further exploring correlations between felt intensity and microzonation site classes, and to provide basic data on a relationship between felt intensity and instrumental ground motions. Skills: Python; experience working with data. Mentors: Fred Pollitz, Erin Wirth; Location: Seattle, WA.

8. **Machine Learning for Ground Motion.** Test the performance of the Graph Prediction of Earthquake Shaking (GRAPES) Earthquake Early Warning algorithm on the USGS ShakeAlert earthquake test suite. Learn deep learning inference, GPU computing, and software development. Skills: Programming experience required (Julia, Matlab, or Python - project will be done in Julia). Data science, engineering math, and calculus-based physics classes helpful but not absolutely necessary. Mentors: Tim Clements; Location: Pasadena, CA; Moffett Field, CA.

9. **Fiber Optic Seismology.** Build a web database of Fiber Optic Seismology experiments related to earthquake science, intended to discover links between specific experiments and the USGS earthquake, geological, and fault databases. Learn about a new branch of seismology with applications in both basic science and industry, and interact with scientists within and outside USGS. Skills: some familiarity with python, GIS, and/or JSON a plus. Mentors: Jeff McGuire, Clara Yoon, Andy Barbour. Location: Pasadena, CA; Moffett Field, CA; Vancouver WA.

10. **Earthquake Location Analysis Programming**. Earthquake focal mechanisms provide insight into the geometry of faults, how faults move, and the stresses acting on faults. Depending on your interests, you could convert previous code into our new Python package and integrate new features (e.g., machine learning) into the workflow. Skills: Proficient with Python; Experience interpreting earthquake focal mechanisms; Familiarity with other programming languages a plus. Mentors: Rob Skoumal; Location: Moffett Field, CA.

11. **Earthquake Geology.** We seek an intern (or two) to learn and conduct field work and geographic (GIS) processing and analysis mapping, measuring, and surveying active faults around northern California or perhaps elsewhere. Projects may include use of imagery, modern survey equipment, and various geographic or analytical software to understand hazardous faults. Skills: interest in geology especially tectonics, structure, or geomorphology, field work, GIS experience is helpful; Mentors: Austin Elliott, Jessie Vermeer, Chad Trexler, Belle Philibosian, Steve DeLong; Location: Moffett Field, CA.

Other opportunities may be available by the time we are making selections. We encourage you to submit application materials even if none of the listed opportunities are a perfect fit! We seek students with a wide range of experience and interests.