

Chaminade University of Honolulu
DS 422 – Geocomputation (Fall 2025)

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Office Hours: Thursdays 3:50 – 4:30 PM or by appointment

University Course Catalog Description

This course introduces the principles and practices of geocomputation, focusing on computational methods applied to geographic data for insight and decision-making. Students will work with open-source tools, including R, sf, terra, mapgl, and the Earth Observing System Data and Information System (EOSDIS) Gateway via the earthaccess Python library, which revolutionizes NASA Earth science data access by drastically reducing the complexity required to search, download, and analyze data.

The course integrates JetStream virtual machines for scalable cloud computing and GitHub for open science collaboration and portfolio building, preparing students for modern, reproducible geospatial workflows.

Course Overview

DS422 is a practice-oriented exploration of geocomputation within the broader context of geographic information science. Students will manipulate and compute geographic data through technical exercises, live demonstrations, and applied projects.

New elements include:

- earthaccess (Python) for NASA EOSDIS data access.
- JetStream Virtual Machines for scalable computation and reproducible workflows.
- GitHub for version control, collaborative coding, and portfolio-ready project publication.

Course Learning Outcomes

- Import, clean, and transform geographic datasets in R (sf, terra).
- Access and analyze NASA Earth science data using earthaccess.
- Utilize JetStream VMs for cloud-based geocomputation workflows.
- Build reproducible, collaborative geospatial workflows with GitHub.
- Deploy interactive computational maps (mapgl) for stakeholder engagement.

Required Learning Materials

- R packages: sf, terra, mapgl, tidycensus
- Python library: earthaccess for NASA EOSDIS data access
- GitHub account for collaborative, open science portfolio building
- JetStream virtual machine access (provided by instructor)

Course Schedule (Updated Weeks)

Week 1: Setup: R, RStudio, Python, GitHub Desktop; intro to sf, terra, mapgl, earthaccess, JetStream VMs

Week 3: Tsunami Evacuation Zones: integrate EOSDIS satellite imagery via earthaccess

Week 7: Raster Computation with terra; NASA datasets via earthaccess; publish results to GitHub

Week 11: Defense & DoD Applications: large-scale modeling using JetStream VMs

Week 13: Reproducible Workflows: GitHub for open science, collaboration, and portfolio building

Open Science and Accessibility

"Since open science is a collaborative effort involving people from different technical backgrounds, our team took the approach that data analysis can and should be made more inclusive and accessible by reducing the complexities of underlying systems."

This ethos guides our adoption of earthaccess, JetStream VMs, and GitHub, ensuring students gain skills to work effectively across computational environments while contributing to open, transparent science.

Assessment

- Participation and Communication: 36 pts

- Assignments (4x): 44 pts

- Final Project & Presentation: 20 pts

Total: 100 pts

Grading Scale:

A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F < 60%