

**IRIS Education and Public Outreach Program  
Seismology Skill Building Workshop - Summer 2022**

**Instructor(s) Information:**

Instructor: Dr. Michael Brudzinski, Professor – Miami University

Office Telephone: 513-529-9758

E-mail: [brudzimr@miamioh.edu](mailto:brudzimr@miamioh.edu)

Teaching Assistant: Dr. Shannon Fasola, Post-Doctoral Researcher – Kansas University

E-mail: [shannon.fasola@ku.edu](mailto:shannon.fasola@ku.edu)

Teaching Assistant: Gillian Goldhagen, PhD Student – University of California, Riverside

E-mail: [ggold002@ucr.edu](mailto:ggold002@ucr.edu)

Instructor: Michael Hubenthal, Senior Education Specialist – IRIS

Office Telephone: 607-777-4612

E-mail: [hubenth@iris.edu](mailto:hubenth@iris.edu)

Teaching Assistant: Yuri Tamama, PhD Student – California Institute of Technology

E-mail: [ytamama@caltech.edu](mailto:ytamama@caltech.edu)

**Preferred Contact Method**

**Please Note:** *Slack* is the preferred method of contact for this workshop as the scale of enrollment will prevent us from returning emails or phone calls in a timely manner. You will receive a much faster response when using *Slack*.

**Workshop Description**

The IRIS Education and Outreach program and Miami University are offering a FREE seismology skill building workshop for any undergraduate (e.g., computer Science, geophysics, geology, math, physics) student seeking to build scientific computing skills while working with seismic data. The goals of this workshop are to increase students'...

- interest in taking additional course work in seismology and scientific computing,
- self-efficacy in using seismic data, and
- competitiveness in the graduate school or summer REU application process.

This workshop will be offered as **fully online only**. Thus, all of the learning activities will be available 24 hours a day, seven days a week. **The workshop will run from June 13th, 2022 through September 4<sup>th</sup>, 2022.** New modules will be introduced every other week. Each module is comprised of assignments that have been designed to develop a particular set of skills relevant for seismological research. Participants will work through the assignments in each module at their own pace. Students will be able to ask questions, provide feedback, and

share their successes and challenges with other participants through the *Slack* discussion forum. Supplemental materials such as relevant papers, videos, and other resources will be made available for those who wish to extend their learning. While there is no deadline for the completion of each module, other than the conclusion of the workshop, we will provide a suggested schedule to help students keep up with the introduction and development of new content. **We anticipate that students will be required to invest roughly 5 to 6 hours per week to successfully complete the workshop.**

**Workshop webinars will be held every Monday at 2pm US Eastern from June 13<sup>th</sup>, 2022 to August 29<sup>th</sup> 2022.** All webinars will be recorded to allow participants from across a variety of time zones to participate. These will introduce new content, provide tips and suggestions to get the most out of each module, and provide support for concepts or skills that appear to challenge students.

### **Workshop Requirements**

- To participate, students have needed access to a PC/Mac/Linux machine to successfully complete the assignments, although a Chromebook or tablet may work with the new software implementation. Students should not need to install software on these machines. Rather, all work will be done in a cloud-based solution.
- Since the workshop is online and will require accessing a web-based software implementation, reasonable internet access (e.g., DSL, LAN, or cable connection desirable) is expected.

### **Online Access & Technical Assistance**

*Workshop assignments:* Each of you has been provided with an account on the workshop Moodle learning management system website. Use the login information you received by email to login and follow the instructions to begin. The assignments were created to follow an interactive e-learning tutorial style. This means that they will be comprised of questions that typically have some instructions for completing a computing task or learning about a concept, followed by a multiple-choice question regarding the skill. Upon submitting an answer to the question, you will receive feedback about whether the answer was correct or incorrect with some information about why. If the answer was incorrect, you will be able to answer again for partial credit (-1/3 credit for each attempt). This cycle can be repeated several times for each question. This approach is designed to give you immediate feedback on your understanding of the concepts and skills, and then allow you revise your understanding as needed based on the feedback provided. Moodle saves your progress with each answer submission, so you can pick up where you left off if you need to logout at any time. If you find a particular assignment difficult, you can complete the entire assignment a second time after a brief waiting period.

*Workshop computing:* The assignments in this workshop will require participants to utilize a variety of scientific computing software that is housed in a cloud-based server called OpenSarLab. **Two participate, you will need to create an account in the OpenSarLab using the**

**email address you used when registering for the workshop.** Instructions for this are provided in the Tutorial assignment in Module 0 on Moodle. While all the software is free, some requires an end-user agreement as you work through Module 0. At the end of the summer, we will provide everyone with instructions to create an archive of their work on the server that they can download to their local machine. That way, if you choose to install the software we were using during the workshop, you would then be able to interact with your data and files again.

*Workshop discussions:* While it would be great to get to meet all the participants in person, the global nature and size of the workshop makes that impossible. This means an important component of your workshop experience will be using a communication tool to staying connected with both the instructors and the other participants in the SSBW. *Slack* will be the primary tool we use for this purpose. It provides a single space for asking questions about the workshop and its administration. Discussions are separated into various channels to ensure that you can find the discussion you want to participate in, when you need to participate in it. For example, details about the workshop administration can be found in the #syllabus channel. Discussions about each workshop module will be separated by assignment to help focus the conversations... (e.g., #module1\_tutorial1, #module1\_tutorial2, #module1\_tutorial3, etc.) There will also be space for anyone seeking help with computing issues, coding, data wrangling, mapping, etc. #support. **Each of you will be provided with an invitation, via email, to join a *Slack* workspace for the 2022 Seismology Skill Building Workshop. All participants are expected to accept this invitation and join us!** *Slack* has both a desktop and mobile apps which are much easier to use than the web browser version. Thus, we suggest you consider downloading these so you can keep connected and be responsive to each other in a timely fashion.

*Assistance:* **If you find that you have any trouble with assignments or other aspects of the workshop, your first action should be to post questions in the appropriate *Slack* channel.** Remember, there are no dumb questions, and if you are having an issue, it is quite likely that others are as well. Each of you have valuable expertise and experiences that can benefit others. Thus, we expect participants to also respond to the inquiries of others to exploring questions and challenges raised by their peers, especially if students have prior experience with some of the tools we are using. Of course, instructors and the TA will also be monitoring *Slack* channels and will participate in discussions as needed.

### **Workshop Participation**

Students are expected to participate in all of the webinars, either live or by watching the webinar recordings, and complete the interactive assignments. As the workshop progresses, participants are encouraged to build rapport with the workshop instructors and other participants through respectful communications on *Slack*. Specifically, we expect participants to support each other with challenges and questions that may arise as everyone works through the weekly assignments. As you will find, building rapport and effective relationships are key to becoming an effective professional.

### **Topic Outline/Schedule** (Subject to revision):

June 13 – Modules 0 & 1: Introduction to scientific computing and coding strategies. Applications will include Linux command line, shell scripting, and basic plot generation with Generic Mapping Tools (GMT), and discussion of general patterns of earthquakes in space, time, and magnitude.

June 27 - Module 2: Seismic recording and seismograms. Applications will include time series analysis, digitization, filtering, and Seismic Analysis Code (SAC).

July 11 - Module 3: Data access and IRIS Data Request Tools. Applications will include web services, data availability tools, Wilber, and Fetch scripts.

July 25 - Module 4: Event and waveform databases. Applications will include an introduction to strategies for organizing data, available catalogs, principles of earthquake location, and hypocentral location software.

August 8 - Module 5: Introduction into Python, how it works (calculating via a loop), and basic uses. Applications for seismology in ObsPy including data structures, retrieving data via the internet, seismogram plotting, and correlation detection.

August 22 - Module 6: Jupyter notebooks. Applications will include an introduction to notebooks and then some useful examples such as those demonstrating spectrograms and calculating background seismic noise reductions due to COVID19.

September - Wrap-up, review, and next steps for pursuing seismology.

### **In addition, special webinars (possible topics below) may be interspersed**

- Networking
- The graduate school process
- Careers and career paths

### **Scoring**

Assignments/Assessment: The ~35 tutorial-based scientific computing assignments used in the course, each consist of a series of ~30-40 questions that ask you to perform tasks and interpret their results in the context of seismology. Questions are graded automatically in a mix of multiple choice, multiple answer, text short answer, and numerical short answer. If you enter the incorrect response for a question, you will be able to answer again for partial credit (-1/3 credit for each attempt). You will be able to see your scores on the assignments as you go. However, at the end of the workshop a Performance Report summarizing how you did on each assignment (along with workshop averages) and when they were completed will be provided.

Final Project: A final project will be assigned to all students during the first several weeks of the workshop. This project will be designed to allow you to showcase the cumulative knowledge that you have gained through the SSBW. **The final project is optional and will not be scored.**

### **Student Code of Conduct**

Although our classroom environment is virtual (online), the standards of behavior are as important as they are in “brick and mortar” schools. In other words, our virtual classrooms are real classrooms with real teachers and real students; therefore, appropriate behavior is expected. To ensure that all participants understand how to behave in an online environment, we have developed the following code of conduct that all participants are required to follow. This code of conduct addresses student interaction with instructors and participants, as well as students’ individual actions.

#### *Interactions with instructors*

1. Students should phrase communications with instructors in a polite and respectful manner appropriate for a classroom.
2. Since our online environment is a learning environment, students should not use excessive “slang” or language that they might use in other environments. Students are not to use obscene, profane, threatening, or disrespectful language or images in any workshop communications.
3. Students must use a screen name, email address, and profile picture that is appropriate for an educational environment. Email addresses that use profanity or may otherwise be construed as offensive, shall not be permitted. Profile pictures should be a head-shot of the participant only and may not be offensive or inappropriate in any manner. Workshop instructors reserves the right to determine if a student screen name, email address, and/or profile picture is inappropriate. Students using an inappropriate screen name, email address and/or profile picture will be required to update their user profiles in order to participate in the workshop.

#### *Interactions with participants*

1. All communications with other students must be of a workshop-related nature. Any sending of unsolicited communication to other participants is prohibited.
2. All communications with other students in any forum, workshop-related email, discussion post, etc., must be polite, courteous, and respectful. Students are not to use obscene, profane, threatening, or disrespectful language or images in any workshop communications.

#### *Copyright*

All materials provided to you in this workshop are copyrighted. No workshop materials may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, **for use by anyone but you** without the prior written permission from the Instructors. This includes the posting of any workshop

content or materials (including your answers to assignments) on the internet (e.g., on websites like Course Hero). Students who appear to break this rule will be investigated for misconduct.

#### *Use of Prior Work*

You are not allowed to use or view another student's prior work on any assignment in this workshop, including accessing another student's Moodle account. Doing so is academic dishonesty.

#### *Academic Dishonesty*

Academic dishonesty is defined as engaging or attempting to engage in any activity that compromises the academic integrity of the institution or subverts the educational process, including as a means to complete or assist in the completion of an academic assignment. An academic assignment is defined as the submission or presentation of any student work for evaluation, grade, or academic credit. This definition applies to work submitted through online or electronic means. Academic dishonesty includes, but is not limited to, the following: Cheating (using or attempting to use or possessing any aid, information, resources, or means in the completion of an academic assignment that are not explicitly permitted by the instructor or providing such assistance to another student), Plagiarism (presenting as one's own the work, the ideas, the representations, or the words of another person/source without proper attribution), Fabrication (falsification, invention, or manipulation of any information, citation, data, or method), Unauthorized collaboration (working with another individual or individuals in any phase of or in the completion of an individual academic assignment without explicit permission from the instructor to complete the work in such a manner), Misrepresentation (falsely representing oneself or one's efforts or abilities in an academic assignment), and Gaining an unfair advantage (completing an academic assignment through use of information or means not available to other students or engaging in any activity that interferes with another student's ability to complete his or her academic work). Students are expected to be familiar with what academic dishonesty is and what constitutes violations of it. If unsure, students have an obligation to ask their Instructors questions pertaining to the issue.

#### *Disciplinary Action*

Violations to this Code of Conduct will initiate the following procedure. Upon receiving a report of a violation, workshop instructors will investigate the report and determine what, if any, disciplinary action must be taken. A violation of the Code of Conduct will result in a disciplinary action and may result in the expulsion of the student from the workshop.