

# University of Nebraska

## Teacher Coding Workshop Agenda

### June 25th - 27th, 2024

#### Workshop Goals

1. Review and apply basic aspects of computer programming in Python, such as conditionals, math functions and plotting, and file manipulation.
2. Use simple programming tools to analyze large datasets generated from the CMS experiment and run analyses of these data. Generate conclusions about these analyses that include both calculations and plots (e.g. of invariant or transverse mass).
3. Search for new scientific datasets available online and write code to perform analyses of these new data.
4. Design a series of code-centered activities that either add onto existing units in a K-12 course, or replace an already existing activity; create a plan for implementation of these activities.

**Location:** 101 Pound Hall <https://maps.app.goo.gl/S2gjmAxaVVstxdMZ8>

There are two public garages close by at 11 & Q and 13 & Q

Wifi Access – for guest wifi access here are the instructions:

- Connect to NU-Guest
- Go to this website <https://services.unl.edu/services/network-wifi/nu-guest>
- Click “Create Account”
- If you send your credentials to email, you’ll have to use your phone to get that information

#### UNL Faculty Advisor

Michael Bergland-Riese

#### Quarknet Coding Fellows

Tracie Schroeder - Kansas State Center, [bravesearth@gmail.com](mailto:bravesearth@gmail.com)

Megan Alvord - Virtual Center (North Carolina), [ms.mealvord@gmail.com](mailto:ms.mealvord@gmail.com)

#### Participants

1. Abby Langner
2. Zach Gould

3. Sarah Scofield
4. Tracy Monroe
5. Anne Upp
6. Porschea McAllister
7. Mattison Montgomery
8. Angela Hagaman

## Bringing a Laptop

Plan on bringing one if you can. Mac/PC/Linux/Chromebook is all fine. Some of the interactive websites we will use are not optimized for phones/tablets (especially those requiring Java/Flash) and data entry in spreadsheets and coding notebooks is tedious on a tablet. An internet-capable phone will not be sufficient.

## Before Camp

- Tech stuff
  - You'll also need a laptop or Chromebook for the coding activities logged into a Google account that isn't linked to your school account (there may be school restrictions that cause problems). Test your setup by doing some (or all) of [this Intro coding activity](#). If you have trouble with that, let us know and we'll get you sorted out. (Tablets and iPads aren't great for the coding activities we're doing.)
- Studying
  - You do not need to read or study before the camp. But if you're itching to get started, see the "Resources" section at the end of this page for ways to spend your time while you're avoiding other stuff around the house.
- Money
  - \$360 stipend for completing the workshop
  - Professional Development certificate for 20 contact hours.
- Questions? Email Adam at [adamlamee@gmail.com](mailto:adamlamee@gmail.com)

## Day 1

<b>Session 1</b>	<p>9:00 Welcome</p> <ul style="list-style-type: none"> <li>• Stipends → attendance           <ul style="list-style-type: none"> <li>○ Call Anne Zakas and give SSN</li> <li>○ 574-631-2789 Encrypted and such</li> </ul> </li> <li>• Wifi</li> <li>• Parking</li> <li>• Introductions</li> <li>• <a href="#">IRIS-HEP</a></li> </ul>
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	<p>9:45 Norms discussion and activity</p> <ul style="list-style-type: none"> <li>● <a href="#">Hopes and Fears</a> survey <ul style="list-style-type: none"> <li>○ Hopes and Fears Responses</li> </ul> </li> <li>● In groups: <ul style="list-style-type: none"> <li>○ <a href="#">STEP-UP poster</a> from <a href="#">APS STEP-UP</a> <ul style="list-style-type: none"> <li>■ <a href="#">STEP-UP poster (Spanish)</a></li> </ul> </li> <li>○ <a href="#">Fermilab norms poster</a></li> <li>○ Which poster items resonate with what you're doing this week?</li> <li>○ Which poster would you hang in your classroom?</li> </ul> </li> </ul> <p>10:15 Our philosophy re:coding</p> <ul style="list-style-type: none"> <li>● <a href="#">Pair Programming</a></li> </ul> <p>10:25 Driver/navigator time</p> <ul style="list-style-type: none"> <li>● Remember to MAKE A COPY of the notebooks</li> <li>● You can start with this notebook as an <a href="#">Intro to coding</a></li> <li>● Once both group members feel a little more comfortable try this notebook: <a href="#">Probability and Histograms using dice</a> <ul style="list-style-type: none"> <li>○ An updated <a href="#">Probability</a> with hints!</li> <li>○ <a href="#">Coin Flipper</a></li> <li>○ <a href="#">Dice Roller</a></li> </ul> </li> <li>● And also this one <a href="#">ifs &amp; Loops</a></li> </ul> <p>12:00 Lunch Break</p>
<b>Session 2</b>	<p>1:00 Continue driver/nav work from session 1.</p> <ul style="list-style-type: none"> <li>● Upload notebooks <a href="#">here</a></li> </ul> <p>2:00</p> <ul style="list-style-type: none"> <li>● <a href="#">Modeling Position vs Time Graphs</a> <ul style="list-style-type: none"> <li>○ <a href="#">Modeling and graphing projectiles with air resistance</a></li> </ul> </li> </ul> <p><a href="#">The Circle Lab</a></p> <p>3:30 Share out of probability notebooks</p> <p>3:45 All hands meeting</p> <ul style="list-style-type: none"> <li>● Google can be the best programming help</li> <li>● <a href="#">Daily feedback survey</a></li> </ul>

## Day 2

<b>Session 1</b>	<p>9:00 All Hands meeting</p> <ul style="list-style-type: none"> <li>● Successes / challenges from yesterday's notebooks</li> </ul>
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	<ul style="list-style-type: none"> <li>● Share out of position notebooks <ul style="list-style-type: none"> <li>○ <a href="#">Tracker video tracker</a></li> </ul> </li> <li>● Group photo later this AM</li> <li>● Why python?</li> </ul> <p>9: 30 <a href="#">Particle Identity</a></p> <p>9:35 <a href="#">CMS Experiment review</a>  <a href="#">Ana Maria's slides</a> (Copy of AMS's slides)</p> <p><a href="#">Processing LHC Data</a> - great video!</p> <p>10:15 Start on this notebook: <a href="#">Calculate the mass of a muon using CMS data</a>.</p> <p><a href="#">Svaha</a> link (science/nerdy clothing)</p> <p>11:50 Group Photo #1</p> <p>12:00 Lunch Break</p>
<p><b>Session 2</b></p>	<p>1:00 Continue work on muon mass notebook</p> <p>2:00 Switch to Teacher Hat mode</p> <ul style="list-style-type: none"> <li>● <a href="#">What most schools don't teach</a> video</li> <li>● Work on one of these notebooks and share some things you learned like new code or new ideas and how this could be implemented in a classroom <ul style="list-style-type: none"> <li>○ <a href="#">Wrapping paper &amp; surface area</a> (MS Math)</li> <li>○ <a href="#">Perimeter vs Area</a> (HS math)</li> <li>○ <a href="#">Bigfoot sightings</a> example implementation</li> <li>○ Learn <a href="#">plate tectonics by inquiry</a></li> <li>○ <a href="#">Sunspot counts and locations</a> example implementation</li> <li>○ <a href="#">Quakes</a> example implementation</li> <li>○ <a href="#">Word Analysis</a></li> </ul> </li> </ul> <p>2:30 Work solo or in groups</p> <ul style="list-style-type: none"> <li>● Implementation advice and examples on <a href="#">CODINGinK12.org</a> Thanks Adam.</li> <li>● Brainstorm lesson ideas</li> <li>● Start on implementation plan <ul style="list-style-type: none"> <li>○ Resources for data <ul style="list-style-type: none"> <li>■ <a href="#">Trends.google.com</a></li> <li>■ <a href="#">Data.gov</a></li> <li>■ <a href="#">Google data search</a></li> <li>■ <a href="#">Nasa Earth Data</a></li> <li>■ <a href="#">NOAA Climate Data</a></li> <li>■ <a href="#">Sports Statistics</a></li> </ul> </li> </ul> </li> </ul>

	3:45 All Hands Meeting <ul style="list-style-type: none"> <li>• <a href="#">Daily feedback survey</a></li> </ul>
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## Day 3

<b>Session 1</b>	<p>9:00 All Hands</p> <ul style="list-style-type: none"> <li>• Thoughts from yesterday</li> <li>• How to do this without Google access?             <ul style="list-style-type: none"> <li>○ On your computer: Install <a href="#">Anaconda</a> (includes Jupyter, Python, &amp; all your favorite modules)</li> <li>○ Free online:                 <ul style="list-style-type: none"> <li>■ <a href="#">Trinket</a></li> <li>■ <a href="#">Repl.it</a></li> <li>■ <a href="#">jupyter.org</a> (free lite version)</li> <li>■ <a href="#">IBM deepnote</a> (must be 16+, age restricted)</li> </ul> </li> </ul> </li> </ul> <p>9:15 Continue working on implementation plan</p> <ul style="list-style-type: none"> <li>• Brainstorm and data search</li> <li>• develop a plan for implementation with your students</li> <li>• use whatever format or structure you'd like</li> <li>• A good place to include your implementation plan is in your coding notebook.</li> <li>• Be prepared to have others look at your implementation plan and coding activity during Session 2.</li> <li>• <a href="#">Elevate your notebook for students</a></li> <li>• Upload your implementation plan <a href="#">here</a></li> </ul> <p>When you need a mental break today, please fill out these two forms</p> <ol style="list-style-type: none"> <li>1. <a href="#">Registration</a> (2 minutes)             <ol style="list-style-type: none"> <li>a. For QuarkNet center put other</li> </ol> </li> <li>2. <a href="#">Survey</a> (15-20 minutes)             <ol style="list-style-type: none"> <li>a. You won't be able to answer all the questions, that's ok!</li> </ol> </li> </ol> <p>Extra HS math notebook: <a href="#">What if it has infinite sides?</a> Polygon exploration</p> <p>10:00 Leen-Kiat Soh  <a href="https://www.youtube.com/watch?v=vQOK3YNeTDE">https://www.youtube.com/watch?v=vQOK3YNeTDE</a>  <a href="https://github.com/profeck/profeck.github.io">https://github.com/profeck/profeck.github.io</a></p> <p>12:30 Lunch Break (everyone together)</p>
<b>Session 2</b>	<p>1:30 Share plans for implementation</p> <ul style="list-style-type: none"> <li>• Each camper shares their lesson concept and notebook. Others participate as a student might.</li> </ul>

	<ul style="list-style-type: none"> <li>• Others provide comments/feedback</li> <li>• The author can make their own notes with comments/feedback.</li> </ul> <p>2:30 <a href="#">Introduction to QuarkNet</a></p> <ul style="list-style-type: none"> <li>- <a href="#">QuarkNet website</a></li> <li>- <a href="#">QuarkNet data portfolio</a> (activities)</li> <li>- <a href="#">Quarknet Workshops</a></li> <li>- Ken Cecire, kcecire@nd.edu</li> </ul> <p>3:15 Resources</p> <ul style="list-style-type: none"> <li>• <a href="#">Matplotlib Cheatsheets</a></li> <li>• <a href="#">Matplotlib Plot Types</a></li> <li>• <a href="#">Example plots</a></li> </ul> <p>3:40 Group Photo #2</p> <p>3:45 Housekeeping and sign off</p> <ul style="list-style-type: none"> <li>• <a href="#">Exit Survey</a></li> </ul>
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Hi All

This is to confirm that we will be seeing you at UNL on June 25-27 for the IRIS-HEP Coding Workshop.

The workshop will begin run from 9:00 - 4:00 in 101 Pound Hall  
<https://maps.app.goo.gl/S2qjmAxaVVstxdMZ8>)

There are two public garages close by at 11 & Q and 13 & Q.

Plan on bringing a laptop. Mac/PC/Linux/Chromebook are all fine. Some of the interactive websites we will use are not optimized for phones/tablets (especially those requiring Java/Flash) and data entry in spreadsheets and coding notebooks is tedious on a tablet. An internet-capable phone will not be sufficient.

### **Before Camp**

Tech stuff

- You will need a laptop or Chromebook for the coding activities logged into a Google account that ideally isn't linked to your school account (there may be school restrictions that cause problems). Test your setup by doing some (or all) of [this Intro coding activity](#). If you have trouble with that, let us know and we'll get you sorted out.

Studying

You do not need to read or study before the camp. But if you're itching to get started or really worried about not knowing much about particle physics, here are some links to get you started.

- [Particle Adventure](#) - good resource for students
- [Hyperphysics particle physics topics](#) - medium difficulty between Particle Adventure and PDG
- [Particle Data Group PDG](#) - detailed resource, includes pamphlet you can order, or use interactive online version
- [CERN detector overview](#), good for students
- [Don Lincoln explains!](#)
- [Detailed presentation on detector physics](#), includes historical overview
- [Particle identities quiz](#) - find out which particle fits your personality best and learn about the properties of elementary particles

We do have a waiting list, so please reply to this email indicating you are able to attend.

Tracie Schroeder  
KSU QuarkNet  
QuarkNet Coding Fellow