

# QISKIT GLOBAL SUMMER SCHOOL

JULY 20 - 31

**ENGAGING** CONNECTING WITH OTHERS **INCLUSIVE** USING SHARED LANGUAGE  
CONNECTING WITH **GLOBAL CULTURES AND DIVERSE BACKGROUNDS**  
**EMPATHETIC** **ASSUMING GOOD INTENTIONS** FORWARD-LOOKING OUTLOOK  
BUILDING RELATIONSHIPS **CREATING EXPERIENCES** TEAMMATE-  
ORIENTED **POSITIVE** **LIFTING OTHER VOICES** ACTIVE LISTENING  
**ACCOUNTABLE** DOCUMENTING AND SHARING PROJECTS **LEARNING**  
**HONESTY** **COLLABORATING** BUILDING TEAM TRUST  
USING **RESPECTFUL** LANGUAGE **BE YOU!**  
OPEN ABOUT YOURSELF AND YOUR GOALS  
**GENUINE** COMFORTABLE &  
**FUN!**

We appreciate your support in keeping this experience for registered attendees only, and welcome your [feedback and suggestions](#) for any improvement. Please do not share the lecture and lab materials outside the attendees of the Qiskit Global Summer School.

# ABOUT

**W**elcome to the first-ever Qiskit Global Summer School hosted by IBM Quantum. We are excited to have you join us for a 2-week dive into quantum computing through daily lectures and lab sessions, as well as a vibrant community set up for you to meet other students and collaborate together to solve problems. Through education and open science, we aim to build and shape a diverse, equitable, and inclusive quantum workforce. We're thrilled to have you join us on this journey.

**Please read through this Attendee Guide to find answers about the structure, setup, agenda, and resources that accompany the Summer School. This is not a passive class - whether you're in lectures only, or also participating in the lab sessions, we need your engagement to make it a success. Grab a notebook and a pen, and find your favorite chair. The Qiskit Global Summer School is just about here.**



## INDEX

- Schedule & Syllabus
- Labs & Study Groups
- Resources
- What to Expect: Virtual Events
- Code of Conduct

## LINKS

- Join the the Discord Server
- Read the Textbook
- Share the Website
- Follow Qiskit on Twitter

# SUMMER SCHOOL SYLLABUS

<div>July, 20 <b>Monday</b></div> <div><b>WELCOME &amp; OPENING REMARKS</b> <i>Presenter: Scott Crowder, Liz Durst</i></div> <div><b>QUBITS &amp; QUANTUM STATES, CIRCUITS, MEASUREMENTS</b> <i>Lecturer: Elisa Baumer</i></div> <div>ASSOCIATED TEXTBOOK READING Sections <a href="#">1.1</a> - <a href="#">3.2</a></div> <div>Afternoon Lab Lead: Abe Asfaw</div>	<div>July, 21 <b>Tuesday</b></div> <div><b>WRITING &amp; RUNNING QUANTUM</b> Programs with Textbook Quantum Algorithms <i>Lecturer: Elisa Baumer</i></div> <div>ASSOCIATED TEXTBOOK READING Sections <a href="#">3.4-3.6</a>, <a href="#">3.10</a></div> <div>Afternoon Lab Lead: Abe Asfaw</div>	<div>July, 22 <b>Wednesday</b></div> <div><b>SHOR'S ALGORITHM I</b> The Quantum Fourier Transform and Quantum Phase Estimation <i>Lecturer: Abe Asfaw</i></div> <div>ASSOCIATED TEXTBOOK READING Sections <a href="#">3.7-3.8</a></div> <div>Afternoon Lab Lead: Abe Asfaw</div>	<div>July, 23 <b>Thursday</b></div> <div><b>SHOR'S ALGORITHM II</b> Going From Factoring to Period-finding and Writing the Program <i>Lecturer: Abe Asfaw</i></div> <div>ASSOCIATED TEXTBOOK READING Section <a href="#">3.9</a></div> <div>Afternoon Lab Lead: Abe Asfaw</div>	<div>July, 24 <b>Friday</b></div> <div><b>QUANTUM ERROR CORRECTION</b> via Repetition Codes <i>Lecturer: James Wootton</i></div> <div>ASSOCIATED TEXTBOOK READING Section <a href="#">5.1</a></div> <div>Afternoon Lab Lead: James Wootton</div>
<div>July, 27 <b>Monday</b></div> <div><b>SUPERCONDUCTING QUBITS I</b> Quantizing a Harmonic Oscillator, Josephson Junctions <i>Lecturer: Zlatko Minev</i></div> <div>ASSOCIATED TEXTBOOK READING: Sections <a href="#">6.3</a></div> <div>Afternoon Lab Lead: Nick Bronn</div>	<div>July, 28 <b>Tuesday</b></div> <div><b>SUPERCONDUCTING QUBITS II</b> Readout and Circuit QED, Calibrating a Qubit Frequency and Readout <i>Lecturer: Zlatko Minev</i></div> <div>ASSOCIATED TEXTBOOK READING: Sections <a href="#">6.1</a>, <a href="#">6.4</a></div> <div>Afternoon Lab Lead: Nick Bronn</div>	<div>July, 29 <b>Wednesday</b></div> <div><b>QUANTUM CHEMISTRY I</b> Going from Problem Description to Qubit Hamiltonian for H<sub>2</sub> and LiH <i>Lecturer: Antonio Mezzacapo</i></div> <div>ASSOCIATE TEXTBOOK READING: Section <a href="#">4.1.2</a> + additional reading</div> <div>Afternoon Lab Lead: Antonio Mezzacapo</div>	<div>July, 30 <b>Thursday</b></div> <div><b>QUANTUM CHEMISTRY II</b> Solving qubit Hamiltonian for H<sub>2</sub> and LiH using VQE <i>Lecturer: Abhinav Kandala</i></div> <div>ASSOCIATE TEXTBOOK READING: Section <a href="#">4.1.2</a> + additional reading</div> <div>Afternoon Lab Lead: Abhinav Kandala</div>	<div><b>CAREER PANEL</b> JULY 31</div> <div>Join us for an exciting Career Panel session with industry-leading speakers and their insights on how to start your career in quantum.</div>

## ABOUT LECTURES

Duration: 3 hours (with breaks)

Curriculum starts with quantum fundamentals and leads all the way to quantum chemistry  
Q&A available during lecture (use the question feature on Crowdcast!)  
Be an active audience member - take notes along with the lecturers!

# THE FUN DOESN'T END WITH THE SUMMER SCHOOL...

AUGUST 5, 2020

**QISKIT SUMMER SCHOOL  
FINAL PROJECT!** *(OPTIONAL)*

Now that you know about quantum.... What's next? What can you do with it? Level up summer school learnings and recent education with the Final Project. Develop an expanded quantum understanding by working on a unique challenge with the insights from your teammates and recent learnings to guide you along the way.

AUGUST 15, 2020

**APPLY TO BECOME A  
QISKIT ADVOCATE!**

The Qiskit community is comprised of some of the best minds in all of quantum. There's even a program, the Qiskit Advocates, for top-notch contributors and members to apply and join. Qualified people must pass a test showing their knowledge, and also link to different ways they've contributed to the community at large. Learn more about the program from Junye Huang's blog post [here](#).

## ABOUT DISCORD

Discord will be used for all Qiskit Global Summer School event communications, updates, study groups, lab work, Q&A, and more. Students will be able to “raise their hand” to get support - notifying mentors directly!

## GET SET UP IN THREE EASY STEPS!

- 1** Download [Discord](#) and [Join the Summer School Server](#)
- 2** Catch up on [#Announcements](#), try out commands in [#Sandbox](#), and review important information in [#Welcome!](#)
- 3** Have Fun! Learn lots! Qiskit on!

## SUBMITTING LAB WORK



A link to the lab recording and the workbook download file will be posted on #instructions in the Summer School Discord each day around 1:00 PM EDT

An internet connection will be required in order to submit the workbook (a Jupyter notebook)

Through the exercise make sure to read, complete, and submit each cell in order. Loss of internet will not cause a critical failure but if something does happen, you can submit again. Only the highest score will be counted

In the final field in the exercise you will provide your name and email. It is critically important that you provide the same exact name and email each time. Submit your answer by running the cells in order

If any concerns arise upon submitting, please reach out in #support-labs.

The grading will take a minute or two to complete. Once finished, a status indicator will appear below your submission box. It will indicate the passing status (  or  ), which is uploaded to IBM.

The deadline for all workbooks to be submitted is August 2 at 11:59pm EDT. Note that the process does take time, so if you wait until the last minute, you probably will miss the deadline. Do not wait until the last minute. No past-due workbooks will be accepted

# ABOUT LABS

Duration: 1 hour (or less)

Demonstrating lecture material with hands-on exercises on quantum programming using Qiskit  
Pre-recorded session complete with problem set exercise.

## GUIDELINES FOR LABWORK

Labs will not be reviewed during lecture, so take the time to sit down and review your work.

For the best experience, join and work with a study group for material review and application.

Don't forget! There's an entire community here and ready to help you!

## RECORDINGS & LAB SOLUTIONS

Lab recordings will be released daily at 1:00 PM EDT.

Solution videos will be posted at 1:30 PM EDT the following day for access and review.

### IMPORTANT NOTE!

**You have the option to submit your notebook multiple times, only the highest score will contribute to your cumulative average.**

## CERTIFICATES

**Only people who are invited to and complete all of the lab work will be getting a certificate of completion.**

Lab work will be assigned as Jupyter notebook exercises. The notebooks must be completed and submitted by the end of the Summer School, on **August 2 (11:59 PM EDT)** with a cumulative average score of 65% or higher in order to receive a certificate.

# ABOUT STUDY GROUPS

Meet other students, study together, and work through problem sets as a group.  
IBM Quantum will provide dedicated support and mentors for lab work and exercises.

## HOW TO START OR JOIN A GROUP

### #FIND-STUDY-GROUP

Cast a wide net around the world to create study groups with fellow students around the globe.

### CONNECT IN REGIONAL GROUPS

Time-zone centric channels are pre-created in Discord and you will be tagged in your appropriate channel. Meet other people (with a top obstacle removed: TIME!) and form groups from there!

## STUDY GROUP BEST PRACTICES

[Tips and tricks for virtual collaboration](#) and team work!



## GROUP GUIDELINES

Within the Study Group categories, all lab students can create their own dedicated channel by hitting the “+” symbol next to the category - come up with a fun group name to show off!

Study groups should have up to 10 people (but no more than that)

Don't feel restricted to your own time zone - feel free to jump around to the active time zone that interests you!

# RESOURCES



## QISKIT INTERACTIVE TEXTBOOK

[For supplemental information, guidance, and exercises](#)

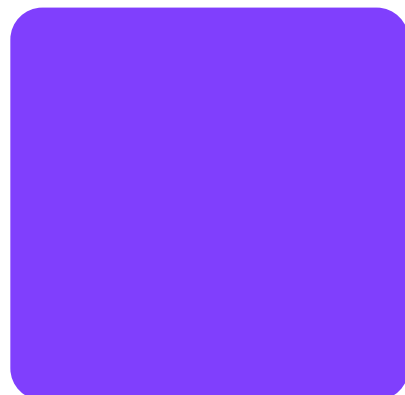
Whether you are learning, teaching, or contributing - the Qiskit Textbook is an incredible resource available to all. Check out some of the exercises and advanced lessons to level up your own skills before (and during!) the Summer School!

**1** **Learn About & Install Qiskit**  
Keep on [learning about Qiskit](#) and install before the Summer School. From high-level technical learnings to exciting connections in the community!

### Tip!

Use the [YouTube tutorial](#) for install help - or check out [this documentation!](#)

**2** **Qiskit Slack Community**  
Become a part of the connected and ever-growing community of [Qiskitters on Slack](#).



**3** **IBM Quantum Experience**  
[Create your IBM ID](#) and have full access to learn, develop, and run quantum programs on real quantum computers via this cloud platform.

### Tip!

Check out the [IBM Quantum Experience beginners guide](#) to get started!

**4** **Learn at Khan Academy**  
The prerequisiteis for the summer school are [Basic Probability](#), [Matrix Multiplication](#), and [Python](#). You can find helpful materials covering all of these in the [Khan Academy](#).





# WHAT TO EXPECT IN A VIRTUAL EVENT

NAVIGATE THIS VIRTUAL EVENT TO YOUR MAXIMUM ADVANTAGE

AS EASY AS 1, 2, 3...

**1** Enter the event with a positive **attitude!** Have your own goals, and don't let a webcam slow you down from reaching them. Our top recommendations are to get comfortable using your webcam, and to not be shy raising your hand to ask (or answer) questions

**2** Seems simple enough, but it's worth a quick reminder: **update your software and check your connections.** Is your mic connected? Are your permissions up to date? Do a quick test run with a friend to make sure you are all set and ready to go when the event starts!

**3** Don't get overwhelmed, and **enjoy yourself!** You are here to share an experience with others, and we all want to make it as enjoyable and educational as possible. The Summer School community will be with you every step of the way; watch your friends and colleagues unwind and get to know each other.

## SELF CARE TIPS IN A VIRTUAL WORLD

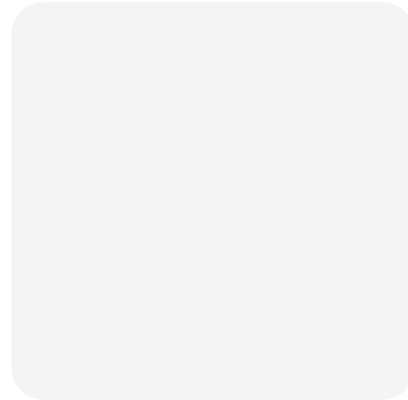
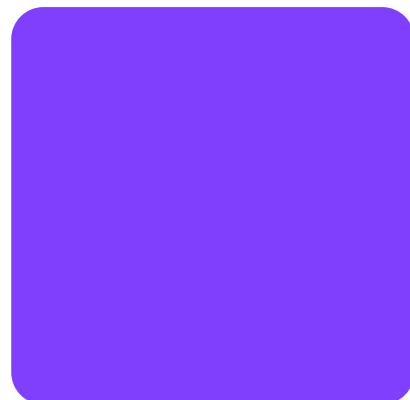
It can be easy to lose track of screentime - even in an event, [take care of you!](#)

## TIPS & TRICKS: FOR THOSE AT HOME

Whether participating in an event or simply working from home - [some tips!](#)

**CODE OF CONDUCT**

Make sure and review and be familiar with the official [!CodeofConduct](#)



ANY  
QUESTIONS?

LET US KNOW!

