Student Handbook

2020-2021 Qubit by Qubit Introduction to Quantum Computing with IBM Quantum

Updated: October 7, 2020

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ABOUT THE COURSE

Notes:

- If you did not receive your student ID, please email us, and we will resend it in the next 24 hours.
- If you already submitted the confirmation form but not with the student ID, you are confirmed and fine.
- We are dealing with a high volume of student activity and communication so please be patient; we will get back to you as soon as we can.

About the Course

Welcome to The Coding School's Qubit by Qubit's *Introduction to Quantum Computing* with IBM Quantum. This is a first-of-its-kind course aimed at making quantum computing accessible to students as young as high school. Up until now, quantum computing is often taught at the university, if not graduate school, level. Because of the increasingly important role quantum computing will play over the next decade and beyond, we believe it's critical that early access to quantum computing education is widely available, which is why we created this course.

In Semester 1, students will learn the foundational math and programming concepts necessary for quantum computing. Once these are taught, Semester 2 will focus on quantum mechanics, quantum information and computation, and quantum algorithms. Students will use Qiskit and IBM Quantum Experience to run quantum simulations on real quantum hardware. By the end of the course, students will have foundational knowledge in quantum computing at the college-level. Through this course, students will have the opportunity to attend panel discussions by leading quantum researchers, engage with future quantum leaders (like yourself!), and run simulations on real quantum computers.

The goal of this course is to introduce students to the exciting world of quantum computing. As you'll hear time and time again through this course, you will not understand everything - or close to it. It takes significant time to understand the complexity of quantum, so please don't get stressed or frustrated if you don't understand something. Over time, it'll become more familiar and understandable. This course is intended to be accessible to anyone with knowledge of trigonometry. More advanced math will still be required to master quantum, but it is our aim to teach you everything beyond trigonometry that you need to know.

Objectives

Train the future diverse quantum workforce

- Introduce students to the field of quantum computing
- Develop foundational skills, including math, computer science, and physics, necessary to pursue quantum computing
- Prepare students with tangible and real-world STEM skills
- Deepen understanding of quantum applications
- Learn about career opportunities in quantum
- Increase diversity in STEM fields
- Introduce students to industry and academic leaders in quantum
- Form a global cohort of future quantum leaders

Weekly Requirements

Each week, there are three requirements:

1. Lecture
2. Lab
3. Homework

Note: The course is entirely virtual, including lectures and labs.

Lecture

Every Sunday from 2-4pm EST, there is a 2-hour lab lecture. On average, there will be 1-hour of lecture and 1-hour of tutorial. The lectures will be co-led by instructors Amir Karamlou and Francisca Vasconcelos. Recordings will be available for those unable to attend the live sessions. Closed captioning will also be made available in the recordings. We strongly encourage students to attend the live lab sections if their time zone allows.

Lab

Labs are 1-hour long, in which a Teaching Assistant (TA) will go over students' questions, practice problems similar to the homework, and the previous weeks' homework assignments. Labs will start the week of October 18th. More information will be available the week of October 11th about labs. Students are expected to attend their lab section weekly.

Homework

Each week, there will be a homework assignment related to the lecture. The homework, on average, should take students around 1 hour to complete. We welcome your feedback if it is taking much longer than that. Homework assignments will be released following the lecture, and they will be required to be submitted by 11:59 p.m. EST the following Saturday. Prior to the submission deadline, students will have unlimited homework submissions. Solutions will be released the following Sunday.

Attendance

In terms of attendance, students are expected to attend the live lectures and lab sessions. If you are unable to attend any of the lab session, please note it on the form that will be sent the week of October 11th and further instructions will be sent.

Course Syllabus

In the calendar below, you can find the topics that will be covered each week. A detailed syllabus with weekly lectures and homework assignments will be added on Discord.

Semester 1 focuses on the foundational math, programming, and physics concepts required to learn quantum computing. For some, this may be a review. We aim to relate as much of the content to quantum computing as possible. Topics include:

- Classical Computing
- Quantum Computing in the Abstract
- Math: Introduction to Vectors and Complex Numbers, Probability
- Math for Quantum Mechanics
- Introduction to Python Programming

Semester 2 focuses on quantum mechanics, quantum information, and quantum algorithms. Topics include:

- Quantum Mechanics
- The Qubit and Bloch Sphere
- Gates, Measurements and Quantum Circuits
- Quantum Key Distribution
- Superdense Coding + Quantum Teleportation
- Classic Algorithms
- Deutsch-Josza Algorithm, Grover's Algorithm, VQE & QAOA
- Experimental Metrics and Implementation

CALENDAR

Week		Date + Time	Event
Week 0: 10/11-10/17	**Orientation**	10/11/20: 2-4pm EST	Lecture
		10/17/20: 12-1pm EST	Panel Discussion with TAs
Week 1: 10/18-10/24	Classical Computing	10/18/20: : 2-4pm EST	Lecture
		Various times	Lab
Week 2 10/25-31	Quantum Computing in the Abstract	10/25/20: 2-4pm EST	Lecture
		Various times	Lab
Week 3 11/1-11/7	Intro to Vectors + Complex Numbers	11/1/20: 2-4pm EST	Lecture
		Various times	Lab
Week 4 11/8-11/14	More Vectors + Matrices	11/8/20: : 2-4pm EST	Lecture
		Various times	Lab
Week 5 11/15-11/21	Intro to Probability + Mathematics for Quantum Mechanics Pt. 1	11/15/20: 2-4pm EST	Lecture
		Various times	Lab
Week 6 11/22-11/28	Introduction to Python (Part 1)	11/22/20: 2-4pm EST	*Optional Lecture**
		No Lab (Thanksgiving)	
Week 7 11/29-12/5	Introduction to Python (Part 2)	11/28: 2-4pm EST	*Optional Lecture**
		Various times	Lab
Week 8 12/6-12/12	Mathematics for Quantum Mechanics Pt. 2	12/6/20: 2-4pm EST	Lecture
		Various times	Lab
Week 9	Mathematics for	12/13/20: 2-4pm EST	Lecture

12/13-12/19	Quantum Mechanics Pt. 3 + Second Semester Overview	Various times	Lab
WINTER BREAK: 12/20/20 - 1/9/21			
Week 10 1/10-1/16	Math for Quantum Mechanics Review	1/10/21: 2-4pm EST	Lecture + IBM Quantum Panel
		Various times	Lab
Week 11 1/17-1/23	Quantum Mechanics (Part 1)	1/17/21: 2-4pm EST	Lecture
		Various times	Lab
Week 12 1/24-1/30	Quantum Mechanics (Part 2)	1/24/21: 2-4pm EST	Lecture
		Various times	Lab
Week 13 1/31-2/6	Quantum Mechanics (Part 3)	1/31/21: 2-4pm EST	Lecture
		Various times	Lab
Week 14 2/7-2/13	The Qubit & Bloch Sphere	2/7/21: 2-4pm EST	Lecture
		Various times	Lab
Week 15 2/14-2/20	Qiskit Intensive	2/14/21: 2-4pm EST	Lecture
		Various times	Lab
Week 16 2/21-2/27	Gates, Measurement, & Quantum Circuits Pt 1	2/21/21: 2-4pm EST	Lecture
		Various times	Lab
Week 17 2/28-3/6	Gates, Measurement, & Quantum Circuits Pt 2	2/28/21: 2-4pm EST	Lecture
		Various times	Lab
Week 18 3/7-3/13	Quantum Key Distribution (BB84) + Final Project Introduction	3/7/21: 2-4pm EST	Lecture
		Various times	Lab

Week 19 3/14-3/20	Superdense Coding + Quantum Teleportation	3/14/21: 2-4pm EST	Lecture
		Various times	Lab
Week 20 3/21-3/27	Classic Algorithms Overiew + Deutsch-Josza Algorithm	3/21/21: 2-4pm EST	Lecture
		Various times	Lab
Week 21 3/28-4/3	Experimental Metrics & Implementations Pt 1 [Metrics - T1, T2]	3/28/21: 2-4pm EST	Lecture
		Various times	Lab
SPRING BREAK: 4/4/21 - 4/17/21			
Week 22 4/18-4/24	Experimental Metrics & Implementations Pt 2	4/18/21: 2-4pm EST	Guest Lecture
		Various times	Lab
Week 23 4/25-5/1	Grover's Algorithm	4/25/21: 2-4pm EST	Lecture
		Various times	Lab
Week 24 5/2-5/8	VQE & QAOA	5/2/21: 2-4pm EST	Lecture
		Various times	Lab
Week 25 5/9	Course Wrap Up	5/9/21: 2-4pm EST	Faculty/Industry Panel
		No Lab	

**These lectures are optional if you have previous coding experience in Python through foundational programming concepts and basic data structures. Topics you must be well-versed in include: variables, loops, functions, and lists.*

PEOPLE

Qubit by Qubit (QxQ)

QxQ is an initiative by The Coding School (TCS), a 501(c)(3) tech education nonprofit dedicated to preparing students with the technical skills for the future of work. To learn more about TCS, visit: www.codeconnects.org

Administrators

Kiera Peltz (she/her/hers), Executive Director
Kiera is the founder of The Coding School and executive director of Qubit by Qubit. She is a Gates-Cambridge and Schwarzman Scholar and holds an MPhil in Sociology and MMSc in Economics and Business from the University of Cambridge and Tsinghua University, respectively. She graduated magna cum laude from Brown University.

Rachel Zuckerman (she/her/hers), Program Director
Rachel is the Director of The Coding School's Qubit by Qubit quantum initiative. She's interested in using technology to improve government services and increase social mobility. Previously, Rachel worked at the Michigan Department of Health and Human Services, focused on behavioral health policy and then COVID-19 response in her home state. In addition, she worked in workforce development for the City of Detroit, helping eliminate barriers to employment for Detroiters. Rachel earned her undergraduate degree from the University of Iowa, where she had the privilege of serving as Student Body President, and her master's degree in Beijing, China, representing the United States as a Schwarzman Scholar.

Kiley Foster (she/her/hers), Program Manager
Kiley is the Program Manager for Qubit by Qubit, and has worked for The Coding School's development/fundraising team. She holds an MA in Near Eastern Studies from Cornell, where she will also receive her PhD in December 2020. At Cornell, she led courses and workshops on writing, history, and pedagogy. She graduated Phi Beta Kappa from the University of Oklahoma.

Gabbie Meis (she/her/hers), Assistant Program Manager
Gabbie is the Assistant Program Manager for Qubit by Qubit and has a background in editorial and development work. She is a proud first-generation graduate from the University of Iowa where she studied English & Creative Writing, Spanish, and translation.

Heath Schintler (he/him/his), Assistant Program Manager

Heath is an Assistant Program Manager for Qubit by Qubit. Previously, Heath served as a Leadership Consultant for Delta Tau Delta Fraternity, traveling the country working with undergraduate fraternity members. As a Political Science and Ethics & Public Policy graduate

from the University of Iowa, Heath has always maintained an interest in studying government use and adaptation of emerging technologies in their efforts to create better programs and policies. Heath is also a proud alumnus of the University of Iowa Student Government, where he served as Student Body Vice President prior to his graduation in 2019.

Simran Chowdhry (she/her/hers), Chief Operating Officer
Simran is the Chief Operating Officer The Coding School. She is currently a junior at the University of Michigan studying Computer Science. Simran has been with The Coding School for almost 2 years ranging from operational management work to curriculum development. She is extremely passionate about promoting STEM within younger generations!

Instructors

Francisca Vasconcelos (she/her/hers)
Francisca Vasconcelos is currently pursuing an MSc in Statistical Sciences at the University of Oxford, through the Rhodes Scholarship. She graduated from MIT in 2020 with a BS in Electrical Engineering, Computer Science, and Physics. Through undergraduate research in the MIT Engineering Quantum Systems group as well as internships at Rigetti Computing and Microsoft Research Quantum, Francisca has worked on quantum measurement of superconducting devices, statistical learning for error mitigation, machine learning for quantum, and radiation studies. Furthermore, Francisca is very interested in education, serving as a course instructor for MIT's winter-term Intro to Quantum Computing course for two years and leading The Coding School's QxQ academic team.

Amir Karamlou (he/him/his)
Amir is a graduate fellow in the EECS department at MIT. He graduated from MIT with a B.S. in Physics and Electrical Engineering and Computer Science and an M.Eng in Electrical Engineering and Computer Science in 2018. His research motivation is to use quantum mechanics to gain an advantage over current technology and protocols. As an undergraduate he worked with Dirk Englund on control and high fidelity readout of NV centers in diamond.

Curriculum Head

Shoumik Chowdhury (he/him/his)
Shoumik is a senior undergraduate at Yale University, where he is studying Mathematics and Physics. He has been pursuing quantum computing research since the age of 16, starting as a high-school intern at the Tata Institute of Fundamental Research, in Mumbai, India. Since coming to Yale, he has worked on experimental and applied theoretical research projects at the Yale Quantronics Laboratory, the Yale Quantum Institute, and Yale Wright Lab — and he spent a year working as a quantum engineer at Rigetti Computing. Outside of work, Shoumik is very interested in outreach and education projects: in addition to developing curriculum materials on The Coding School's QxQ academic team, he has also served as a peer tutor for Yale's

Intensive Intro to Physics class and he is currently the co-president of the Yale Society of Physics Students.

Homework Head

Brian Mills (he/him/his)
Brian Mills is a research technician in the Research Laboratory for Electronics at MIT. Brian received a BS in Physics and a minor in Japanese from MIT in 2020. In the past, Brian has worked on quantum error correction for quantum computers and thin film materials research. In his current research, he uses the principles of quantum mechanics, optics and chemistry in order to design, fabricate and perform measurements on 3D nanostructured materials. Outside of research, Brian was a teaching assistant for physics classes at MIT for 2 years, and is now part of the QxQ teaching team.

Head TA

Akshay Agarwal (he/him/his)
Akshay is a postdoctoral researcher in the Research Laboratory for Electronics at MIT. In his research, he applies principles of quantum mechanics to improve the efficiency of electron microscopy and make the technique applicable to live biological samples. Akshay obtained his PhD. in Electrical Engineering and Computer Science from MIT in September 2020, and his B. Tech. and M. Tech. in Electrical Engineering from IIT Bombay in 2014. Outside of his research, Akshay enjoys teaching, writing, and playing the violin.

TAs

Sarah Muschinske (she/her/hers)
Sarah is a PhD student at MIT working on quantum simulation using superconducting qubits

Aziza Almanakly (she/her/hers)
Aziza received her B.E. in Electrical Engineering from Cooper Union in 2020. As an undergraduate, she developed quantum devices in the context of electrons on superfluid helium, color centers in nanomaterials, and superconducting circuits. Aziza is currently a graduate student in EQuS, where she is researching waveguide quantum electrodynamics in superconducting circuits. Outside of the lab, you can find Aziza singing or playing volleyball.

Corbin McElhanney (he/him/his)
Corbin is a fourth-year Software Engineering student and C.D. Howe National Scholar at the University of Waterloo. Since attending the Quantum Cryptography School for Young Students at Waterloo in high school, he has been passionate about the rapidly evolving world of quantum computing. He is currently an intern at QuEra, a neutral-atom quantum computing startup founded by leading researchers at Harvard and MIT, where he studies the connection between quantum algorithms and near-term hardware implementations. Prior to joining QuEra, Corbin was a Kleiner Perkins Fellow at cybersecurity startup

Shape Security and held internships at Microsoft and Advanced Micro Devices. For the past four years, he has volunteered in various roles with Hack the North, one of the biggest student hackathons in the world.

Phil Labrum (he/him/his)
Phil is a fourth-year student at Harvard University from London, England. He is currently studying Computer Science and Neuroscience with a minor in physics, and his research interests are at the intersection of fMRI studies and quantum computing. At college he spends his time volunteering at Youth Lead the Change and helping to run the Quantum Computing Collaborative (QCC) with teammates at Harvard, MIT, UC Davis and EPFL.

Elina Sendonaris (she/her/hers)
Elina recently graduated MIT with a degree in physics, and is currently researching 2D quantum circuit simulations and ways to take advantage of quantum vacuum fluctuations to create better x-ray lasers. In her free time, she bikes around Boston and plays songs on the ukulele.

Aman Bansal (he/him/his)
Aman Bansal is a computer science undergrad at École polytechnique fédérale de Lausanne (EPFL) in Lausanne, Switzerland. He also works on the quantum computing textbook.

Rahul Sharma (he/him/his)
Rahul is a postdoctoral researcher at Quantum Materials Center at University of Maryland trying to look for new quantum materials while learning how to grow and identify them using transport measurements. He likes to cook, bake and practice guitar when he is not in the lab studying quantum materials.

Sponsor

We are grateful for the support of our sponsor and collaborator, IBM Quantum, who has helped make this course possible and make it accessible to 5,000 students.

Advisors

Clarice Aiello

UCLA ECE Faculty

James Whitfield

Dartmouth Physics Faculty

Scott Aaronson

UT Austin CS Faculty

Spiros Michalakis

Caltech IQIM Researcher

Ray Laflamme

UWaterloo IQC Director

Umesh Vazirani

UC Berkeley BQIC Director

William Oliver

MIT CQE Director

Abraham Asfaw

Global Lead, Quantum Education & Open Science at IBM Quantum

COMMUNITY NORMS & CODE OF CONDUCT

Community Norms: Engaged, Supportive, Inclusive.

- The Coding School (TCS) is committed to fostering a respectful, empowering learning environment for all students, instructors, staff, and visitors.
- We welcome students from all backgrounds, including those who are new to STEM. We are all on this learning journey together. Every student is on a level playing field, and we can all learn from one another. Students are not in competition with one another and should be supportive, not competitive.
- A core part of our mission is to make the future quantum workforce diverse and inclusive. We actively promote diversity in our courses and want all students to celebrate the different backgrounds and experiences of our students.
- Curiosity, effort, and engagement are valued over perfection. Our main ask is that you are engaged and do your best. Quantum computing is difficult, and we do not expect students to master it on the first - or even second or third - try.
- We ask students to be present, engaged, and supportive of one another.

To read our comprehensive Code of Conduct that you agreed to when confirming your spot in the course, please click here.

For Code of Conduct violations, please fill out the form here. For urgent matters, call our office or email us with the subject line 'URGENT' at student@qubitbyqubit.org

GRADES

TCS Principles for Grading:

- The course is Pass/Fail.[1] A score of 60% is a passing grade. Grades will be determined each semester.
- This class is intended to be an empowering, not stressful, experience for students, and grades are simply a way to ensure students are accountable and engage weekly with the course material. It is not meant to test or compare students.
- We know students come to this course from incredibly diverse backgrounds, with varying exposure to STEM. We will do our very best to accommodate these differences.
- TCS recognizes that remote learning presents unique challenges. Likewise, we know that some students may have barriers to accessing stable internet, lack stable housing, or face other challenges that impede their learning. Increasing diversity in STEM is a core part of our mission, and we will work with students to the greatest extent possible.
- Our grading policy is flexible and subject to change based on student performance.
- Most importantly, we want our students to succeed!

Threshold

As the course is Pass/Fail, 60% is a passing grade. If you complete the homework and show up to lectures and labs, you will pass the course.

Components of Your Final Grade

Homework	50%
Lab Attendance	40%
Complete required course evaluations (completion grade)	10%

- **Homework**: Based on the breakdown, students must, on average, score 20% on the homework to pass the course, assuming they complete the course evaluations and attend the labs. Students are excused for one homework assignment per semester.
- **Lab attendance:** Unless you have noted that you are unable to attend the weekly lab, attendance at the labs is mandatory. There will be a check-in and check-out process each week. You will only need to be marked for one or the other. *If you are not able to attend any session, we will provide instructions to follow in the recording each week.*
- **Course evaluations:** There will be a pre-course evaluation, mid-course evaluation (in December 2020), and end-of-course evaluation in May 2020. These are completion grades - we're looking for feedback and to see how the course went!

[1] *If your school is partnered with us and you are receiving a letter grade, we will send information about this separately to you.*

Final Notes About Grading

Once again, this course is meant to teach you, not test you. Grading assignments and attendance is a way to hold you accountable in a virtual environment. It is not supposed to stress you out, and we have designed the grading system and homework assignments so it is educational, not anxiety-inducing.

EXPECTATIONS AND RESPONSIBILITIES

Weekly Commitments & Academic Year Commitments

As a student in this course, you have committed to attending and completing the entirety of the course, which finishes in May 2020. It is highly encouraged students attend the live lectures and labs. Each week, at a minimum, students must watch the lecture and lab, as well as complete the readings and homework assignment. Throughout the course, there will be three course evaluations, which students are required to complete.

Group Work & Plagiarism Policy:

We encourage students to work together to learn course material. We believe in a collaborative and supportive community where students learn from one another. Students are encouraged to form study groups and use online tools, like Piazza, to complete assignments. However, plagiarism will not be tolerated. Students should not share answers to assignments with one another and should not copy from their classmates. Plagiarism violations will be taken seriously and may be grounds for removal from the course.

TECHNOLOGIES

All technology platforms will be monitored. Do not share links with anyone.

For detailed information about each technology platform, please review the Course Technology Guide.

Video conferencing- Zoom

Website: https://zoom.us/
The video conferencing platform that we will be using for this course is Zoom. Zoom will be used for all lectures and labs. Students who will be attending the live sessions will be sent a registration link for attending the lectures and labs. These same links will be used throughout the course.

For students unable to attend the live sessions, recordings of the will be available. Recordings will be uploaded on Discord to start and then will be uploaded to Canvas once Canvas is launched (beginning of November).

Canvas

Website: https://www.instructure.com/canvas/
Canvas will serve as the central hub for all course materials. This is where you will be able to access lecture and lab recordings, access the homework and submit the weekly homework assignments, and submit your attendance.

Canvas will be launched in early November 2020. Until then, Discord will contain all of the relevant course materials.

Piazza

Website: https://piazza.com/
Piazza is used for all course content-related questions, such as questions from the lecture or lab, homework questions, confusion from the readings, or any other content-related questions.

Discord

Website: https://discord.com/
Discord is a communication portal that will be used for **communication/announcements from the QxQ team** as well as **informal communication between all participants**. Once the course

starts and everyone is added to Discord, this will be how the QxQ will communicate official course announcements. You will receive a unique link that allows you to join the Discord channel. You may also use this channel for informal communication between participants.

For how to's and specific guidelines on the technologies listed above, click here

SCHOOL PARTNERS

For school partners, a School Handbook is available with more information.

DATA PRIVACY POLICY

To view The Coding School's data privacy policy, click here. To summarize, The Coding School does not sell, share, or distribute participants' data to third parties.

QUANTUM RESOURCES

Want to get prepared for the course or do additional reading? Check out some recommended readings on quantum computing + math/programming tutorials to get started **here**.

CONTACT

There are many students in this course, and we are unable to answer specific, individual questions. To ensure students are getting their questions answered and getting the support they need, there are several resources available:

- **Check the FAQs at the end of this document - they include many of the recurring questions.**
- **For course content-related questions, use Piazza.**
- **For logistical questions, use Discord.**

In the event that the FAQs, Piazza, and Discord are not sufficient, you may contact: student@qubitbyqubit.org or call our office: (424)310-8999

For Code of Conduct violations, please fill out the form here. For urgent matters, call our office or email us with the subject line 'URGENT' at student@qubitbyqubit.org.

FAQs

Is it all virtual?
Yes, the entire course is virtual. You can participate from anywhere in the world.

What if I can't commit to completing the entire course?
All students are required to commit to attending for the entire course. If you are unable to commit to this, please reach out to us so we can discuss the circumstances. In general though, we will only admit students who can commit to completing the course.

If you fail to complete the course, you will not be able to participate in any of The Coding School's future programming.

What video conferencing platform will be used?
Zoom will be used for all live instruction.

Are there other opportunities to continue to learn quantum computing after the program finishes?
We are continuing to develop out new programs and opportunities and will keep you informed!

I'm struggling with the material. What additional help can I receive?
Check out questions asked on Piazza and ask additional questions. There are also opportunities to learn from your peers, including office hours and informal study sessions. If you have exhausted these resources and are still struggling, please contact us by email, and we will try to help.

How many hours per week do I need to commit to this?
We expect students to commit around 5 hours a week to the course. For some students who have a strong math and programming background, Semester 1 will be lighter

I want to petition my school to provide high school course credit. What do I need to do?
Email us, and we will provide you with more information about the course. You can bring the information to your school administrator, and we are happy to help answer any additional questions or meet with the school administrator.

What is the attendance policy?
We expect all students to attend the live lectures and labs if possible. Attendance will be taken at the lab the student signs up for.

How will attendance be taken?

During the labs, students will be required to sign into Canvas, the student portal platform we are using, and

Will students be able to ask questions during lectures or labs?
Due to the size of the course, live questions will not be asked. However, students are encouraged to add all questions on Piazza, and the most relevant questions will be addressed. Additionally, TAs will be answering questions on Piazza throughout the course. For panel discussions, students can submit questions, and we will choose students to ask the panelists questions.

Will a certificate of completion be provided?
Yes, a certificate of completion will be provided at the end of the course.