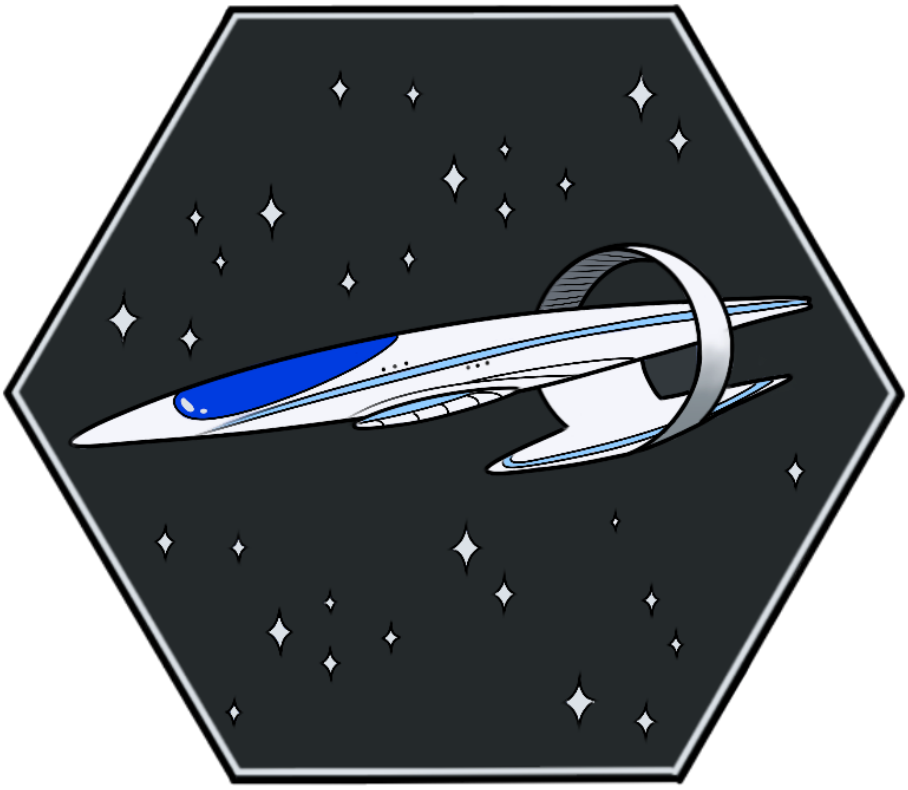
WORKBOOK 1

Qiskit | Quantum Explorers

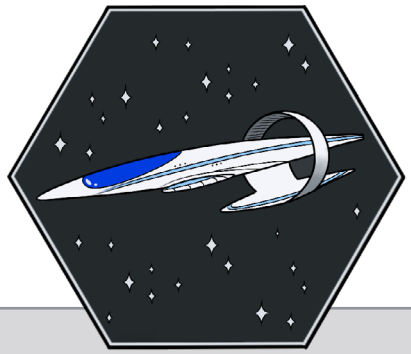
A SELF-PACED QUANTUM LEARNING JOURNEY



Achievement:

CAPTAIN

QUANTUM COMPUTING & QISKIT 101



QUANTUM COMPUTING & QISKIT 101

ACHIEVEMENT TO UNLOCK: CAPTAIN
Become the captain of Earth's first faster-than-light starship and lead humanity into interstellar exploration.

A magnificent Heron-class starship, equipped with faster-than-light travel capabilities, comfortable amenities, weapons, and an enthusiastic crew needs a captain. You are an esteemed explorer and are perfect for the job.

Your starship-to-be is called the ESS _____.

(ESS stands for "Earth Starship". Share your starship's name in the #space-exploration channel on Discord!)

Complete this module to become Captain, ensure a successful launch into space, and become humanity's leading space exploration pioneer.

IN THIS MODULE YOU WILL:

- Learn quantum concepts like superposition, entanglement, and interference
- Understand how quantum gates work and how to run circuits using Qiskit and the IBM Quantum Platform
- Program and run simple circuits and the quantum teleportation algorithm using Qiskit

SYLLABUS

CHECKLIST OF TASKS TO COMPLETE AND MATERIALS TO LEARN

Warm-up Activities

- **LIVE EVENT: Welcome to Quantum Explorers and How to Participate**

  Date: August 2, 2022 [time] [video link]

  Note: all event recordings will be available at the links provided.

- **LIVE EVENT: Badge Kick-off - Quantum Computing and Qiskit 101**

  Date: August 5, 2022 [time] [video link] [demo notebook link]

- **VIDEO: Quantum Computing Expert Explains One Concept in 5 Levels of Difficulty [link]**

  WIRED Youtube video featuring IBM's Dr. Talia Gershon

- **BOOK: Quantum Kittens (Beta) [link]**

  Three chapters of a non-technical book that teaches quantum computing through stories about cats

Main Activities

- **QISKIT COURSE: Introduction to Quantum Computing [link]**

  A short online course for self-learners from all backgrounds (technical and non-technical. Please complete up to and including section ENTANGLED STATES.

- **LAB: Introduction to Qiskit [link]**

  Program basic circuits using Qiskit in a jupyter notebook

- **VIDEO: Quantum Teleportation Algorithm [link]**

  Qiskit Youtube Programming on Quantum Computers S1E5

- **TEXT: Quantum Teleportation [link]**

  Qiskit textbook chapter with notebook demonstration

Extra help: Introduction to Python and Jupyter notebooks

ONLINE VERSION OF SYLLABUS

ADVANCED SYLLABUS

OPTIONAL ADVANCED ADDITIONAL MATERIALS

- **TEXT: Qiskit textbook sections 2.4 and 2.5 [link]**
  Understanding quantum gate operations

Grover's Algorithm

- **VIDEO: Grover's Search Algorithm [link]**
  Qiskit Youtube Programming on Quantum Computers S2E3
- **QISKIT COURSE: Grover's Search Algorithm [link]**
  A chapter of the Qiskit Introductory Course
- **LAB: IBM Quantum Challenge 2020 Exercise [link]**
  Jupyter notebook with an exercise related to Grover's algorithm

RESOURCES

SUPPLEMENTARY MATERIAL

Tool

- **WEB APP: Grokking the Bloch Sphere [link]**
  Application that helps the user understand the Bloch sphere
- **GAME: QiskitBlocks [link]**
  Teaches quantum computing and Qiskit in a Minetest block world [Tips]

Study Material

- **QISKIT COURSE: Visualizing Entanglement [link]**
  A chapter of the Qiskit Introductory Course
- **LAB: Grover's Algorithm [link]**
  In-depth, comprehensive Jupyter notebook

QUIZ

READY TO TEST YOUR KNOWLEDGE AND UNLOCK YOUR ACHIEVEMENT?

ONLINE QUIZ

PASSED?

Congratulations!

Share your achievement in the #level-up channel on Discord.

Did you remember to fill out the level-up form and download your badge after you passed the quiz?

If not, we've provided the links below! Keep the password revealed at the end of the quiz ready.

Note: The password is the same for both the level-up form and the Badge file.

LEVEL-UP FORM

BADGE DOWNLOAD

Keep an eye on the #announcements channel for details about the next modules and Badge achievements.

NOTES