



Digital Europe Programme Project **QCI-CAT**
QCI: Proof of Concept – Secure Connectivity Austria
Digital Europe Work Programme 2021-2022
EU Secure Quantum Communication Infrastructure (DIGITAL-2021-QCI-01)
Project number: 101091642

Project starting date: fixed date: 1 January 2023
Project end date: 31 December 2025
Project duration: 36 months

Document:	Deliverable
Type:	Report
Dissemination Level:	Public
Title:	Online platform for training of users and engineers in quantum communication
Work-Package	WP9
Document number:	QCI-CAT-D9_1
Document Owner:	qtlabs / Lukas Mairhofer
Contributors:	NA
Abstract:	This report describes the online Learning Management System (LMS) for training engineers and stakeholders in the field of Quantum Key Distribution (QKD). This entails a description of the target groups and the respective curricula, an overview over the didactical concepts applied, and a description of the technological implementation in an online LMS.



Key words:	Training, Education, Quantum Communication, Engineers, Stakeholders, Learning Management System
Pages	20
Delivery Date Planned	2025-03-01 (M27)



Revision History

Version	Revision Points	Author(s) & Organization	Date
V 1.0	Initial version containing only the TOC	Lukas Mairhofer (qtlabs)	2024-11-29
V2.0	Complete first version of the report	Lukas Mairhofer (qtlabs)	2025-01-24
V3.0	Revised according to Feedback from Reviewers	Lukas Mairhofer (qtlabs)	2025-02-19

Author List

Organization	Name	E-Mail address
qtlabs	Lukas Mairhofer	lukas.mairhofer@qtlabs.at

Reviewer List

Organization	Name	E-Mail address
UIBK	Benjamin Lanyon	Ben.Lanyon@uibk.ac.at
TU Graz	Lena Heimberger	lana.heimberger@tugraz.at
AIT	Sebastian Ramacher	sebastian.ramacher@ait.ac.at

Copyright Statement

The work described in this document has been conducted within the QCI-CAT project. This document reflects only the QCI-CAT Consortium view, and the European Union is not responsible for any use that may be made of the information it contains. This document and its content are the property of the QCI-CAT Consortium. All rights relevant to this document are determined by the applicable laws. Access to this document does not grant any right or license on the document or its contents. This document or its contents are not to be used or treated in any manner inconsistent with the rights or interests of the QCI-CAT Consortium or the Partners detriment and are not to be disclosed externally without prior written consent from the QCI-CAT Partners. Each QCI-CAT Partner may use this document in conformity with the QCI-CAT Consortium Grant Agreement provisions.

Funding Acknowledgement:

This project has received funding from the European Union's Digital Europe Work Programme 2021-2022 under Project number: 101091642 and the National Foundation for Research, Technology and Development.



Table of content

Revision History	3
Author List	3
Reviewer List	3
Copyright Statement	3
Funding Acknowledgement:.....	3
List of Figures.....	5
List of Tables.....	5
Executive Summary	6
1. Introduction	7
1.1. Purpose and scope of the document.....	7
1.2. Target Audience	7
1.3. Relation to other project work	7
1.4. Structure of the document	7
2. Description of the Deliverable	8
2.1. Target Groups	8
2.1.1. Engineers	8
2.1.2. Stakeholders.....	8
2.2. Skill Sets.....	9
2.2.1. Engineers.....	9
2.2.2. Stakeholders & Decision Makers	9
2.3. Curricula	9
2.3.1. Engineers Curriculum	9
2.3.2. Stakeholder Curriculum	11
3. Description of Methods: Didactical Approach	12
3.1. Flipped Classroom	12
3.2. Blended Learning.....	12
4. Technical Implementation.....	13
4.1. Learning Platform.....	13
4.2. Teaching Videos.....	14
4.3. Supporting Material	16
4.3.1. Fact-Sheets.....	17
4.3.2. Reading Recommendations	17
4.3.3. Self-Checks	17
4.4. Channels for Communication and Interaction	17
Summary	19



Appendix A - List of Acronyms.....	20
Appendix B – Bibliography	21

List of Figures

Figure 1 - Start Section of Moodle Course for Engineers.....	14
Figure 2 - Still from a Teaching Video.....	16
Figure 3 - Screenshot of a Self-Check Question.	17

List of Tables

Table 1 - Teaching Videos Engineers Course.....	14
Table 2 - Teaching Videos Stakeholders Course.....	15



Executive Summary

The implementation of an infrastructure for QKD entails not only the installation of the respective hard- and software, but crucially also establishing the skillset required for the operation and maintenance of this infrastructure. This requires training the workforce in this field as well as stakeholders and decision makers.

To this aim we established an online learning platform on which we provide two courses. The first course addresses engineers in the communication and cyber security sectors, while the second course addresses stakeholders, technology managers and decision makers across a wide range of sectors. We developed two distinct curricula addressing these two target groups.

We implemented these courses using an online platform based on the open-source LMS Moodle which allowed us implementing a range of learning tools such as learning videos, factsheets and self-checks. We used the innovative didactical concepts of Inverted Classroom and Blended Learning to provide the trainees with a modern learning environment in which they can study at their own pace. The LMS is accessible on the internet via the URL www.qurios.academy.

The implementation of D9.1 allows us to proceed with deliverable D9.2.



1. Introduction

This document describes the completion of the deliverable D9.1 of the QCI-CAT project.

1.1. Purpose and scope of the document

In this report we report the completion of the deliverable D9.1. We describe the didactical concepts we applied in our courses as well as the technical implementation of the learning platform.

1.2. Target Audience

Since the dissemination level of this document is “public”, the targeted audience are involved members of the QCI-CAT consortium and government officials as well as the general public with interest in the completion of the deliverable D9.1 of the QCI-CAT project.

1.3. Relation to other project work

The deliverable does not depend on other tasks of the project. Its completion is a necessary condition for following up with the deliverable 9.2, that is with the training of at least 40 persons in the field of quantum communication. The deliverable 9.2 is due by month 36 of the project.

1.4. Structure of the document

The document first outlines the deliverable in Section 2 and then describes its realization with respect to applied didactical concepts as well as regarding the technological implementation in sections 3 and 4.



2. Description of the Deliverable

The talent gap in the field of quantum technologies is a decisive bottleneck for the implementation of quantum communication technologies. The WP9 of the QCI-CAT project addresses this talent gap, thus contributing the overall goal of the project. The deliverable D9.1 realises the main objective of WP9 by providing an online LMS for the training of engineers and decision makers. This online LMS offers two courses addressing the respective target groups. For optimizing the accessibility, we use English as the working language in the courses.

2.1. Target Groups

We identified two target groups whose training will significantly benefit the development and deployment of quantum communication technologies. On the one hand those are engineers in the field of cybersecurity and telecommunication who implement, use and maintain the QKD infrastructure. On the other hand we need to empower stakeholders, technology managers and decision makers who decide, plan and manage the deployment and integration of quantum communication technologies.

2.1.1. Engineers

The target group for our online course on quantum key distribution consists primarily of engineers with a background in computer science, electrical engineering, and related fields. These engineers are typically employed in industries such as telecommunications, cybersecurity, and information technology, where secure communication is paramount. This target group is characterized by some mathematical knowledge, a broad background in the sciences and a general understanding of technologies with in-depth knowledge in specialized areas. The course is designed to enhance their understanding of quantum cryptography principles and practical applications, thereby equipping them with cutting-edge skills to address emerging security challenges.

2.1.2. Stakeholders

The target group for our online course on quantum key distribution includes stakeholders, decision-makers, and technology managers from various sectors. For brevity, in this document we address this target group as "Stakeholders". These persons are responsible for overseeing and implementing secure communication strategies within their organizations, making them ideal candidates for this advanced course. Their disciplinary background is characterized by economic thinking, in-depth knowledge of organizational structures and dynamics, a holistic approach to socio-technological transformation processes as well as broad knowledge about technologies, especially communication technologies. However, their understanding of physics and especially quantum physics might be limited. The course aims to provide them with a comprehensive understanding of quantum cryptography and its potential impact on future security protocols. By educating these key figures, we intend to facilitate informed decision-making and strategic planning regarding the adoption of quantum key distribution technologies. The course will also offer practical insights and case studies to help participants apply quantum key distribution concepts effectively in their respective fields.



2.2. Skill Sets

The skill sets conveyed in the two courses are oriented along the European Competence Framework for Quantum Technologies in the current version 2.5 developed by Greinert and Müller [Greinert2024].

2.2.1. Engineers

The online course on quantum key distribution for engineers covers proficiency levels from A1 (Awareness) to A2 (Literacy). Participants will gain foundational knowledge in Quantum Communication and Networks, including basic quantum concepts, principles of classical and quantum cryptography, and secure communication protocols. The course will enable engineers to understand the need for and the potential of QKD. By the end of the course, engineers will be equipped to understand and evaluate quantum key distribution technologies in their professional roles.

2.2.2. Stakeholders & Decision Makers

In the online course on quantum key distribution for stakeholders, decision-makers and technology managers, participants will develop a robust understanding of the need for quantum safe cryptography and the principles and technologies of quantum information. The course will cover proficiency levels from A1 (Awareness) to B1 (Utilization), ensuring that learners can grasp fundamental concepts and strategize the implementation of quantum technologies. By the end of the course, participants will be equipped to make informed decisions and drive the adoption of quantum key distribution within their organizations.

2.3. Curricula

2.3.1. Engineers Curriculum

The engineers' curriculum consists of 8 lectures:

Lecture 1: Introduction & Cryptography before QKD

- Basic terms: plaintext, ciphertext, cipher
- Communication parties in cryptography
- Discussion of the goals of cryptography: confidentiality, integrity, authenticity
- Symmetric vs asymmetric cryptography
- One-time pad
- Quantum computers and classical encryption
- Store-now-decrypt-later

Lecture 2: Quantum Randomness

- What is randomness?



- Testing randomness
- Heisenberg Uncertainty and why true randomness follows from it
- Superposition as a mathematical realization of such randomness
- Photons, polarization and mutually unbiased bases
- Outlook: Entanglement as shared randomness

Lecture 3: Protocols for QKD

- Basic Concepts of Quantum Information: Qubit, Measurement and Measurement Basis, Superposition, Entanglement, No-Cloning Theorem
- General setup, role of the communication parties and impact of eavesdropping in Prepare and Measure Protocols
- General setup, role of the communication parties and impact of eavesdropping in Entanglement Based Protocols
- Quantum key generation

Lecture 4: Security of QKD

- Security assumptions in classical cryptography and in QKD
- Types of attacks: individual, joint, collective
- Structure of security proofs
- Security of real-world devices

Lecture 5: Key Management in QKD Networks

- QKD networks and communication layers
- Overview over Key Management Systems (KMS)
- Current PQC standards
- The role of PQC in a KMS for a QKD network

Lecture 6: The Technology behind Quantum Cryptography

- Sources: Faint pulse sources and sources for entangled photons
- Quantum channels: Fiber and Free Space links
- Single-photon detectors
- Experimental Realizations

Lecture 7: Performance estimation for real-world QKD)

- Imperfections of real-world QKD devices
- Quantum Bit Error Rate and noise
- Parameters characterizing real-world QKD devices
- Fundamental trade-offs between these parameters
- Technological trade-offs between these parameters
- Calculation of resulting key rates

Lecture 8: Quantum Communication Networks and Technologies beyond QKD?



- Quantum Teleportation
- Entanglement swapping
- Quantum Repeaters
- Bell-tests
- Interpretations of Quantum Mechanics

We slightly adapted the initial version of the curriculum for the course for engineers by discussing the different protocols for QKD in one single lecture instead of two separate lectures. However, this resulted in no changes regarding the content and learning outcomes of the course. From discussions of the editorial team for the teaching videos, changes resulted regarding the content for lecture 5. The focus of the lecture was shifted from a general discussion of Post Quantum Cryptography (PQC) to QKD networks and the role of PQC in the key management within those networks. Thus lecture 5 is now aligned with the overall goals of the QCI CAT project. Furthermore, lecture 3 was extended to include basic concepts of quantum information required for understanding QKD.

2.3.2. Stakeholder Curriculum

The stakeholder curriculum consists of four lectures:

Lecture 1: The Need for Quantum Safe Cryptography

- Symmetric and Asymmetric Cryptography
- Grover's & Shor's algorithms
- Quantum threat to classical encryption
- Quantum Key Distribution
- Timeline for transition to quantum safe cryptography

Lecture 2: The Technology of Quantum Key Distribution

- Polarization
- Quantum Measurements
- Superposition
- Entanglement
- No Cloning Theorem
- Prepare-and-Measure Protocols
- Entanglement-Based Protocols

Lecture 3: Integrating Quantum Safe Cryptography in your Organization: Technical Aspects

- Free Space QKD and Fibre QKD
- PQC complementing QKD
- Key Management Systems
- Integrating QKD in existing security architecture



- State of the Art of QKD

Lecture 4: Integrating Quantum Safe Cryptography in your Organization: Socio-Cultural and Economical Aspects

- QKD as a disruptive technology
- QKD as a business case?
- Use cases for QKD
- Cost of QKD Systems
- Cost of Implementation
- Implementation Strategies

3. Description of Methods: Didactical Approach

We use two innovative didactical approaches which complement each other. The first approach is the Flipped Classroom. This concept changes the traditional roles of students and teachers/trainers. Students acquire a body of knowledge by self-study of learning materials. The personal interaction with the teacher/trainer then is not a classical lecture, but an interactive engagement with the course content in which the students and trainer/teacher discuss questions which remained open or evolved in the self-study phase. The second approach is Blended Learning. This concept describes how students can be provided with those learning materials for self-study on an online platform, and how the course can be structured such that self-study phases alternate with personal interaction phases.

3.1. Flipped Classroom

The Flipped Classroom model is a transformative approach in planning online courses on quantum communication. This method involves students engaging with new material independently through learning videos, fact sheets, and self-checks during the self-study phase. This preparation allows for more effective use of online-tutoring sessions with a trainer, where students can discuss open questions and delve deeper into complex topics. By shifting the initial learning phase outside of the traditional classroom setting, the Flipped Classroom model promotes active learning and critical thinking. [Baker2000] This approach is particularly beneficial in the context of quantum communication, where understanding intricate concepts is crucial. The flexibility of online platforms further enhances this model, accommodating diverse learning styles and schedules, and making advanced education in quantum communication more accessible.

3.2. Blended Learning

The didactical approach of Blended Learning in online courses on quantum communication aims at enhancing student engagement and comprehension [Smith 2022]. By integrating traditional face-to-face instruction with online learning modules, we have created a flexible and interactive learning environment that caters to diverse learning styles. This approach allows students to access course materials at their own pace while benefiting from real-time interactions with instructors and peers during scheduled sessions. To make the courses accessible from everywhere, these interactions will take place in the form of online tutoring.



The use of multimedia resources, such as learning videos, further enriches the learning experience, making complex quantum communication concepts more accessible and understandable. Although the course has only been developed and not yet taught, we anticipate that this Blended Learning model will significantly improve students' understanding and application of quantum communication principles. One challenge we foresee is the need for students to motivate themselves for self-study, which we address through engaging and interactive content.

4. Technical Implementation

4.1. Learning Platform

After exploring the possibility of developing a LMS ourselves, we decided to establish the online learning platform using Moodle. Moodle is a widely used learning platform designed to help educators create effective online courses. [Moodle2025] It is a free and open-source software package, which means anyone can download, use, and modify it under the GNU General Public License. Moodle is developed and maintained by the Moodle Project, which is led by Moodle HQ, a team of developers and educators based in Australia. The project is supported by a global community of users and developers, as well as over 90 certified Moodle Partners.

The utilization of Moodle as a learning platform for online courses has proven to be highly effective in enhancing educational delivery and student engagement. Moodle's robust and flexible framework supports a wide range of teaching and learning activities, including interactive quizzes, discussion forums, and multimedia content. This platform allows for the seamless integration of various educational resources, enabling instructors to create comprehensive and engaging course materials. Additionally, Moodle's user-friendly interface and extensive customization options make it an ideal choice for tailoring courses to meet specific educational goals. The platform's built-in analytics tools also provide valuable insights into student performance and engagement, facilitating data-driven decisions to improve course outcomes. Overall, Moodle's capabilities significantly contribute to the success of online education initiatives. It allows implementing the didactical approaches discussed in Section 2, as it provides the means for supplying the students with a variety of materials for self-study as well as means for interaction among the students themselves and with tutors.

Moodle uses blocks to structure the content of a course. We implemented the courses in such a way, that each lecture in the respective curriculum is represented to a block in the online course. Each block contains one to four teaching videos, a fact-sheet summarizing the take aways of the respective lecture, recommendations for further reading and a self-check with four questions. The students can learn at their own pace, so there is no schedule for their activities.

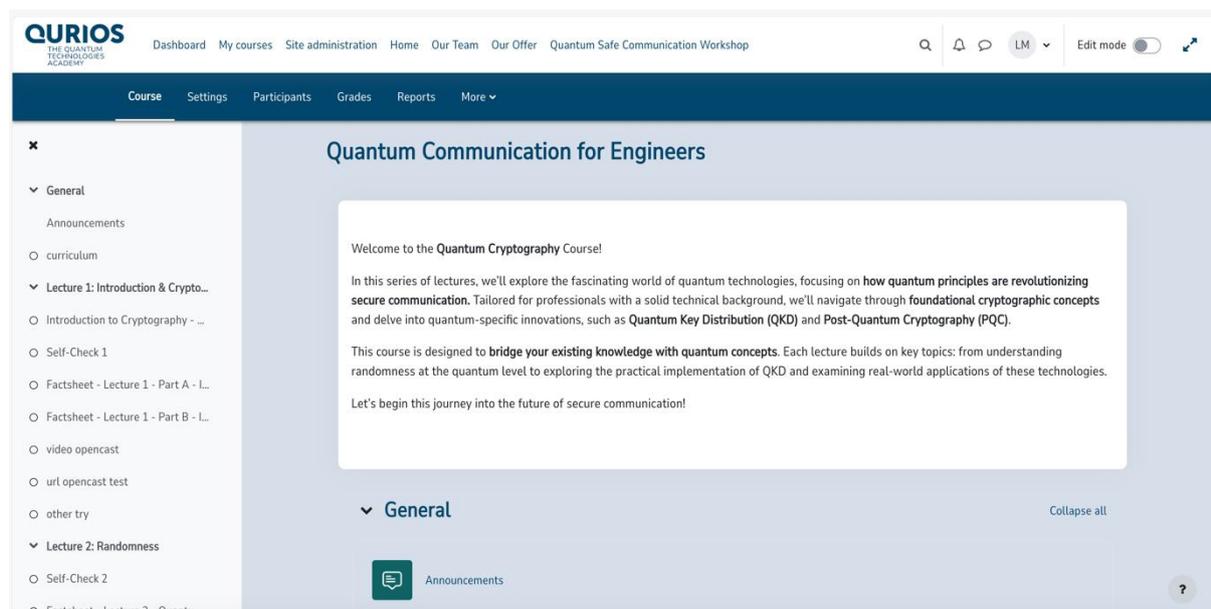


Figure 1 - This screenshot shows the start section of Moodle LMS for the course for engineers

4.2. Teaching Videos

Teaching videos are a valuable tool in online courses as they provide visual and auditory learning experiences, making complex concepts easier to understand. They allow students to learn at their own pace, pausing and rewinding as needed. This multimedia approach caters to different learning styles, enhancing overall comprehension and retention. However, the vast majority of currently available teaching videos on quantum technologies suffers from semi-professional production and postproduction, leading to a lack of motion and change in the picture that would keep the eye and mind attentive. While we did not include interactive quizzes which use the H5P technology, we took several measures to keep the picture dynamic. This includes a slow, unobtrusive motion in the background of the two right thirds containing text and pictures as well as using two cameras, allowing for frequent cuts between close-up and semi-total.

To ensure accessibility, we make a transcript available for each teaching video which can be either read as text or displayed as subtitle.

We produced a series of 23 teaching videos in total. Each video has a length of 5 to 10 minutes, with two exceptions of 14 minutes length. Some of the videos are used in both the engineers' course and the stakeholder course. The following table gives an overview over the topic, speaker and length of each video for the engineers' course.

Table 1 - Teaching Videos Engineers Course

Number	Lecture	Topic	Speaker
1	1	Basic Concepts of Quantum Information	Lukas Mairhofer (qtlabs)
2	1	Notes on Cryptography	Lukas Mairhofer (qtlabs)
3	2	Quantum Randomness I	Ramona Wolf (University Siegen)
4	2	Quantum Randomness II	Ramona Wolf (University Siegen)



5	3	Protocols for QKD	Lukas Mairhofer (qtlabs)
6	4	Security of QKD I	Ramona Wolf (University Siegen)
7	4	Security of QKD II	Ramona Wolf (University Siegen)
8	4	Security of QKD III	Ramona Wolf (University Siegen)
9	4	Security of QKD IV	Ramona Wolf (University Siegen)
10	5	KMS for QKD Networks II	Stephan Laschet (AIT)
11	5	KMS for QKD Networks II	Stephan Laschet (AIT)
12	5	Post-Quantum Cryptography	Stephan Krenn (AIT)
13	6	The Technology behind Quantum Cryptography: Sources	Sebastian Neumann (QI)
14	6	The Technology behind Quantum Cryptography: Channels	Sebastian Neumann (QI)
15	6	The Technology behind Quantum Cryptography: Detectors	Sebastian Neumann (QI)
16	6	The Technology behind Quantum Cryptography: Experimental Realizations	Sebastian Neumann (QI)
17	7	Performance Estimation for real-world QKD I	Sebastian Neumann (QI)
18	7	Performance Estimation for real-world QKD II	Sebastian Neumann (QI)
19	7	Performance Estimation for real-world QKD III	Sebastian Neumann (QI)
20	7	Performance Estimation for real-world QKD IV	Sebastian Neumann (QI)
21	8	Quantum Technologies beyond QKD I	Ramona Wolf (University Siegen)
22	8	Quantum Technologies beyond QKD II	Ramona Wolf (University Siegen)

The following table gives an overview over the topic, speaker and length of each video for the Stakeholder Course. The numbering of the videos is consistent with Table 1.

Table 2 - Teaching Videos Stakeholder Course

Number	Lecture	Topic	Speaker
1	1	Basic Concepts of Quantum Information	Lukas Mairhofer (qtlabs)
2	1	Notes on Cryptography	Lukas Mairhofer (qtlabs)
5	1	Protocols for QKD	Lukas Mairhofer (qtlabs)
13	2	The Technology behind Quantum Cryptography: Sources	Sebastian Neumann (QI)



14	2	The Technology behind Quantum Cryptography: Channels	Sebastian Neumann (QI)
15	2	The Technology behind Quantum Cryptography: Detectors	Sebastian Neumann (QI)
16	2	The Technology behind Quantum Cryptography: Experimental Realizations	Sebastian Neumann (QI)
17	7	Performance Estimation for real-world QKD I	Sebastian Neumann (QI)
18	7	Performance Estimation for real-world QKD II	Sebastian Neumann (QI)
19	7	Performance Estimation for real-world QKD III	Sebastian Neumann (QI)
23	4	Strategies for implementing QKD in your organisation	Julia Dewitz-Würzelberger (Verbund)

The teaching videos were produced using Greenscreen technology. This allowed inserting text and pictures in the postproduction process, resembling of slides in a in-person presentation. While the speaker is positioned in the left third of the frame, the central and right third of the frame are used for text and pictures.

The following picture shows a still from video 4 of the engineers' course:

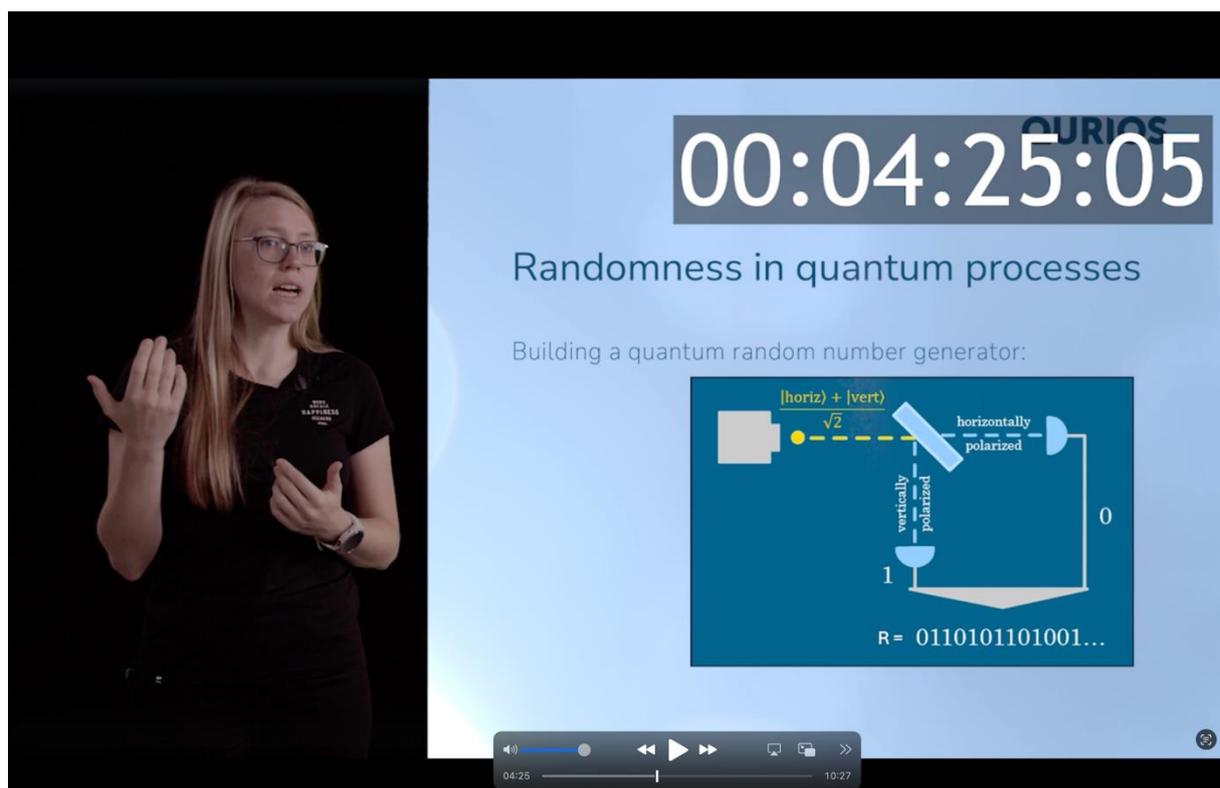


Figure 2 - This Picture shows a still taken from teaching video 4 of the course for engineers.

4.3. Supporting Material



4.3.1. Fact-Sheets

Fact Sheets with a length of one to two pages summarize the key points of each lecture, providing concise and accessible overviews of complex topics, making it easier for students to grasp foundational concepts. They serve as quick reference guides, helping learners review key points and reinforce their understanding. Additionally, fact sheets can be used to highlight important research findings and advancements in the field, keeping students updated with the latest developments

4.3.2. Reading Recommendations

For each lecture, we provide reading recommendations, allowing students to further explore topics they are especially interested in. This allows them to deep-dive into certain areas or clarify questions arising in the self-study phases.

4.3.3. Self-Checks

Each block of the courses ends with a self-check. Self-checks in a Moodle online course are essential for reinforcing learning and providing immediate feedback to students. We applied various question types, specifically multiple-choice tests, drag and drop onto image, drag and drop markers, numerical, and calculated questions. These diverse formats allow checking for different learning goals. The questions were developed with consideration for the learning goals for each lecture as specified in the curriculum.

The screenshot shows a Moodle question interface. At the top left, it says '+ L7_Q1 Fundamental trade off' with a 'Version 6 (latest)' tag. Below this, a 'Question 1' box indicates 'Not complete' and 'Marked out of 1.00'. The main question area is titled 'FUNDAMENTAL TRADE-OFF' with the subtitle 'Long distance vs high rate'. It contains a table with two columns: 'Rate' and 'Distance'. The rows are: 'Highest rate (fiber)', 'Longest distance (fiber)', and 'Longest distance (satellite)'. Below the table are six draggable buttons: '1120 km', '~ 400 km', '< 20 km', '< 5 bit/s', '< 1 bit/s', and '~ 100 Mbit/s'. A 'Check' button is at the bottom left of the question area.

Figure 3 - This Screenshot shows drag-and-drop question from the self-check for Lecture 7 of the course for engineers.

4.4. Channels for Communication and Interaction

Moodle offers several channels for interaction and communication both between the students themselves and between students and tutors. Experience shows that questions arise inevitably when studying quantum physics, and that those questions need to be addressed in personal discussions. Therefore, we will regularly provide online tutoring with an expert in the field for all participants in the



online courses. These online tutoring sessions will take place using Big Blue Button, a video conferencing tool implemented in Moodle. Each tutoring session will be announced in advance in the LMS.

Furthermore, in each course a students' forum provides the participants the means of communicating via a chat-function within Moodle. Since not all students are at the same level as there is no schedule, more advanced students may be able to answer question arising during the study of the lectures. As resources are limited, these chats are generally unmoderated. However, in the case of inadequate behavior, complaints can be made to the host of the courses.



Summary

The QCI-CAT project, funded by the EU's Digital Europe Programme, aims to establish a secure quantum communication infrastructure in Austria. A key deliverable of this project is the development of an online Learning Management System (LMS) to train engineers and stakeholders in Quantum Key Distribution (QKD). The LMS, based on Moodle, offers two distinct courses: one for engineers in cybersecurity and telecommunications, and another for stakeholders and decision-makers. These courses utilize innovative didactical concepts like Inverted Classroom and Blended Learning, providing a modern, self-paced learning environment. The platform includes learning videos, fact-sheets, and self-checks, and is accessible online at www.qurios.academy. The courses employ two innovative didactical approaches: Flipped Classroom and Blended Learning. The project uses Moodle as the Learning Management System, leveraging its robust features to deliver comprehensive course materials, including teaching videos, fact-sheets, and self-checks. Moodle also facilitates communication through forums and online tutoring sessions, ensuring a supportive learning environment.



Appendix A - List of Acronyms

AIT: Austrian Institute of Technology

KMS: Key Management System

LMS: Learning Management System

QI: Quantum Industries

QKD: Quantum Key Distribution

qtlabs: Quantum Technology Laboratories



Appendix B – Bibliography

[Baker2000] Baker, J.W. "The 'Classroom Flip': Using Web course management tools to become the Guide by the Side." In Chambers, J. A. (ed.), Selected papers from the 11th International Conference on College Teaching and Learning (2000), pp. 9–17. Jacksonville, FL: Florida Community College at Jacksonville.

[Greinert24] F. Greinert, F. and Müller, R. (2024). European Competence Framework for Quantum Technologies, Version 2.5 (<https://data.europa.eu/doi/10.2759/389764>)

[Moodle2025] <https://moodle.org> (last retrieved Jan 24th 2025)

[Smith2022] Smith, David P.; Francis, Nigel J. (April 29, 2022). In Mello, L. V.; Watson, Helen (eds.). "Engagement with video content in the blended classroom". *Essays in Biochemistry*. 66 (1): 5–10. [doi:10.1042/EBC20210055](https://doi.org/10.1042/EBC20210055)