Training Course Outline

ITU and National Institute of Telecommunications

Title	Technical, business and regulatory aspects of Artificial Intelligence and Metaverse for future Internet and telecoms
Modality	Face-to-face
Level	Intermediate
Dates	23 – 24 October 2025
Duration	2 days
Language	English
Region	Global
Location	National Institute of Telecommunications (NIT), Warsaw, Poland
Registration type	Application and selection
Registration deadline	22 October 2025
Training fees	500 USD

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Description	This course focuses on technical, business and regulatory aspects of Artificial Intelligence (AI) and Metaverse for future Internet and telecoms. It covers fixed and mobile broadband Internet, QoS, and cybersecurity, AI fundamentals for telecom sector including ITU's Machine Learning (ML), Generative AI, federated learning, Explainable AI (XAI) and responsible AI use. The course includes future AI-based clouds and IoT, including AI as a Service (AIaaS), edge AI and edge clouds, and Industrial IoT. It also covers AI for 5G/6G mobile networks, spectrum management, QoS, and cybersecurity, as well as regulation and governance of AI including Explainable AI (XAI) and effective AI governance. Further, the course covers Metaverse enabling technologies XR, digital twins, IoT, and AI, as well as future 6G and mobile Metaverse services including ITU IMT-2030 framework, AI-native 6G networks and mobile Metaverse services such as immersive XR and Industry 5.0. Also, it includes QoS for future Metaverse, Internet and telecoms, including 6G QoS,, KPIs for mobile Metaverse services, QoS and QoE measurements for future services, as well as personalized QoS and QoE. Finally, the course covers Metaverse cybersecurity including AI and Generative AI tools for Metaverse cybersecurity, digital identity management, blockchain, quantum security, and cybersecurity strategies, as well as key business and regulatory aspects of the Metaverse including competition and market dynamics, privacy, accessibility, network neutrality, and governance for future Metaverse, Internet and telecoms.
Training topics	*Artificial Intelligence*
Certification	*Certificate*
Code	*25WS500257MUL-E-D*

1. TARGET POPULATION

This course is targeted at managers, engineers and employees from regulators, government organizations, telecom operators, telecommunication companies and academia, who are interested in technical, business and regulatory aspects of Artificial Intelligence and Metaverse for future Internet and telecoms, including technologies, standardization, regulation and content. This course also accepts all other institutions and individuals who are committed to building their capacities related to technical, business and regulatory aspects of Artificial Intelligence and Metaverse for future Internet and telecoms.

2. ENTRY REQUIREMENTS

No prior knowledge or qualification is required to register for this course, considering the given target population. Please note that there are 30 places available for this training.

3. LEARNING OBJECTIVES

At the end of the training, the participant will be able to:

- Explain key aspects of Broadband Internet, QoS, and cybersecurity
- Examine Artificial Intelligence (AI) fundamentals for telecom sector
- Characterize main components of future AI-based clouds and Internet of Things
- Analyse the use of AI for 5G/6G, spectrum management, QoS and cybersecurity
- Classify core characteristics of the regulation and governance of Artificial Intelligence
- Discuss metaverse enabling technologies: XR, digital twins, IoT and AI
- Outline future 6G and mobile Metaverse services
- Identify aspects of QoS for future Metaverse, Internet and telecoms
- Exemplify instances of metaverse cybersecurity
- Summarize key business and regulatory aspects of the Metaverse

4. METHODOLOGY

This course will be delivered using face-to-face training methodology, which is defined as follows:

- The course will be conducted as two full days lecture sessions in a face to face manner at the premises of National Institute of Telecommunication (NIT) in Warsaw Poland, on 23 and 24 October 2025. The participants will attend lectures and interact with the tutor on the given topics.
- All presentations from face to face lectures/sessions used during the course will be made available on the ITU Academy platform (before the start of that course day).
- Course forum, asynchronous and online on the ITU Academy, will be organized based on discussion topics raised by the instructor (after participants return to their home countries), on 29 October 2025 for Day 1 lecture material, and 30 October 2025 for Day 2 lecture material, however different dates can be agreed in coordination with the course participants (depending on their travel plans back to home) at the end of Day 2.
- Final Quiz test which will be assigned online on the ITU Academy platform on 31 of October 2025 and will remain open for 72 hours, however different date can be agreed in coordination with the course participants (depending on their travel plans back to home) at the end of Day 2.

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- All information in the course be given in a timely manner (prior to the event) by the course tutor on the ITU Academy platform.

5. ASSESSMENT AND GRADING

The evaluation of the participants will be based on 60% from the Final Quiz and 40% from the answers given in the course forum on the raised discussion topics by the tutor on the ITU Academy after the course, thus reflecting both the quality and the quantity of time spent on the course.

Attendance on the course face to face lectures at the venue in Warsaw is mandatory in order to access the Course Forum and the Final Quiz which will be given later online on the ITU Academy (after the return of participants to their home countries).

The Course Forum will be open on the ITU Academy on 29 October 2025 (after the return of participants to their home countries) according to the GMT time.

The Final Quiz will be open on the ITU Academy platform from 00:00 hours on Friday (31 of October 2025, after the return of participants to their home countries) according to the GMT time, and will remain open at least for 72 hours after opening, so each participant can choose the most convenient time to solve it. It will consist of 20 questions (multiple choices). However, after the start of the attempt the Quiz should be completed in 90 minutes.

Activity	Weighting (%)
Mandatory forum contributions (discussion topics on the ITU Academy platform)	40%
Final Quiz test on the ITU Academy platform	60%
Total	100%

The course is completed successfully with a total grade of 70% or higher. The grading will be completed by the course tutor after the course is fully completed.Each fully registered participant who successfully completes the course with a total grade of 70% or higher will receive an ITU Certificate for this course.

The ITU certificates will be given to participants via the ITU Academy platform after completion of the course reporting and processing within the ITU.

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6. TRAINING DETAILS & INSTRUCTIONAL APPROACH

Day 1:

Time (local)	Sessions	Learning outcomes	Activities
10:00 – 11:00	**1. Broadband Internet, QoS, and cybersecurity**	Outline, discuss, use, analyze, design and evaluate the following topics using technical, business and regulatory aspects: • Internet architectures • Fundamental Internet technologies (TCP, QUIC, UDP, IP, DNS) • IPv6 technology for Internet and telecoms • Web technologies and HTTP 3.0 • Internet/IP QoS • Cybersecurity • Fixed and mobile broadband (optical access, 5G-Advanced) • General IMS (IP Multimedia Subsystem) • 3D Internet access (converged fixed, mobile and satellite broadband) • Internet governnace (technical, non-technical)	Personal attendance at Lecture 1, with physical presence in the course and Q&A session with the tutor at the end of the lecture.
11:00 – 11:30	**COFFEE BREAK**		
11:30 – 13:00	**2. Artificial Intelligence (AI) fundamentals for telecom sector**	Outline, discuss, use, analyze, design and evaluate the following topics using technical, business and regulatory aspects: • Artificial Intelligence (AI) evolution in telecom sector • Types of Artificial Intelligence (Machine Learning, Deep Learning, etc.) • Classification of ML algorithms (supervised ML, unsupervised ML) • Machine Learning (ML) model by ITU • Federated learning • Generative AI • Application of Generative AI in Internet and telecoms • Explainable AI (XAI) and responsible AI use	Personal attendance at Lecture 2, with physical presence in the course and Q&A session with the tutor at the end of the lecture.

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		• ITU's network intelligence levels • Business intent driven networks	
13:00 − 14:00	**LUNCH BREAK**		
14:00 − 14:45	**3. Future AI-based clouds and Internet of Things**	Outline, discuss, use, analyze, design and evaluate the following topics using technical, business and regulatory aspects: • ITU framework for cloud and edge computing • Cloud service models • AI as a Service (AIaaS), ML as a Service (MLaaS) • Architecture for AI cloud platform • AI-based telecom cloud services • Future telecom transition to AI-based cloud computing • AI in Internet of Things (IoT) • Edge AI and Edge Cloud in IoT • Industrial IoT AI framework • AI for IoT smart services (smart city, smart transportation, smart factories)	Personal attendance at Lecture 3, with physical presence in the course and Q&A session with the tutor at the end of the lecture.
14:45 − 15:30	**4. AI for 5G/6G, spectrum management, QoS and cybersecurity**	Outline, discuss, use, analyze, design and evaluate the following topics using technical, business and regulatory aspects: • AI/ML-based spectrum management in 5G/6G • AI/ML for dynamic spectrum sharing in 5G/6G • Predictive analytics and traffic forecasting • AI/ML-based QoS/QoE management • AI/ML for network optimization, planning and upgrades • AI/ML-based network slicing in 5G and 6G mobile networks • AI for cybersecurity optimization and threat detection • AI for fraud detection and prevention	Personal attendance at Lecture 4, with physical presence in the course and Q&A session with the tutor at the end of the lecture.

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		• AI-driven network automation and edge computing • Business impact of AI in future Internet and telecoms	
15:30 – 16:00	**COFFEE BREAK**		
16:00 – 17:00	**5. Regulation and governance of Artificial Intelligence**	Outline, discuss, use, analyze, design and evaluate the following topics using technical, business and regulatory aspects: • ITU's digital regulatory framework • ITU guide for AI and data strategies • Key AI regulatory frameworks (EU AI Act, US Executive Order on AI) • Regulatory approach for Explainable AI (XAI) • Privacy and data protection in AI • AI and risk management • ITU's AI readiness framework • Enforcement for AI compliance with regulatory frameworks • AI Impact on open Internet and network neutrality • Effective AI governance	Personal attendance at Lecture 5, with physical presence in the course and Q&A session with the tutor at the end of the lecture.
Day 1 Conclusions			

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Day 2:

Time (local)	Sessions	Learning outcomes	Activities
10:00 − 11:00	**6. Metaverse enabling technologies**: **XR, digital twins, IoT and AI**	Outline, discuss, use, analyze, design and evaluate the following topics using technical, business and regulatory aspects: • ITU framework and architecture for Metaverse • Internet/IP technologies for the Metaverse • Web 4.0 and virtual worlds • Virtual Reality (VR) and Augmented Reality (AR) • Extended Reality (XR) • Digital twins • ITU framework of IoT for the Metaverse • Cloud and edge computing for Metaverse XR services • Distributed ledger technology for the Metaverse • AI impact on the Metaverse	Personal attendance at Lecture 6, with physical presence in the course and Q&A session with the tutor at the end of the lecture.
11:00 − 11:30	**COFFEE BREAK**		
11:30 − 13:00	**7. Future 6G and mobile Metaverse services**	Outline, discuss, use, analyze, design and evaluate the following topics using technical, business and regulatory aspects: • ITU IMT-2030 framework for 6G • 6G immersive communication, Hyper Reliable and Low-Latency Communication (HRLLC) • 6G massive communication and ubiquitous connectivity • AI-native 6G network, Integrated sensing and communication • AI/ML orchestration and management in 6G mobile Metaverse • Multimedia aspects of Metaverse architecture • Live AR/VR events, immersive XR, IMS-based 3D avatar communication	Personal attendance at Lecture 7, with physical presence in the course and Q&A session with the tutor at the end of the lecture.

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		- XR-enabled collaborative work, location-aware AR - Industry 5.0 services, AR/VR teleoperation - Metaverse cross-platform interoperability, telco vs. OTT (Over The Top) Metaverse services	
13:00 – 14:00	**LUNCH BREAK**		
14:00 – 14:45	**8. QoS for future Metaverse, Internet and telecoms**	Outline, discuss, use, analyze, design and evaluate the following topics using technical, business and regulatory aspects: - QoS, QoE and network performance definitions by the ITU - QoS and KPIs for 6G/IMT-2030 - KPIs for future Metaverse services - Consolidated KPIs for mobile Metaverse services - Challenges in measuring and managing QoS/QoE in the Metaverse - QoS and QoE measurements for future Metaverse, Internet and telecom services - Future traffic management - Personalized QoS and QoE management - Edge computing and QoS/QoE - Regulatory and business aspects of QoS for future Metaverse, Internet and telecoms	Personal attendance at Lecture 8, with physical presence in the course and Q&A sessionwith the tutor at the end of the lecture.
14:45 – 15:30	**9. Metaverse cybersecurity**	Outline, discuss, use, analyze, design and evaluate the following topics using technical, business and regulatory aspects: - Cyber risks, threats, and harms in the Metaverse - AI and generative AI tools for Metaverse cybersecurity (threat detection and response) - Challenges to trustworthiness in the Metaverse - Securing and enforcing content moderation in virtual spaces - Digital identity management in the Metaverse - Security for devices and immersive technologies across Metaverse - Cybersecurity for digital assets and virtual economies	Personal attendance at Lecture 9, with physical presence in the course and Q&A session with the tutor at the end of the lecture.

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		• Blockchain and Quantum security for the Metaverse • Cross-platform security in Metaverse • Cybersecurity strategies for future Metaverse, Internet and telecoms	
15:30 – 16:00	**COFFEE BREAK**		
16:00 – 17:00	**10. Key business and regulatory aspects of the Metaverse**	Outline, discuss, use, analyze, design and evaluate the following topics using technical, business and regulatory aspects: • Metaverse value chain • Competition and market dynamics in Metaverse • Metaverse interoperability and standardization • Legal jurisdiction and data governance • Privacy and user protection in the Metaverse • Human rights and ethical considerations • Accessibility and inclusion in the Metaverse • Intellectual property and virtual/digital assets • Open Internet and network neutrality vs. Metaverse • Governance framework for future Metaverse, Internet and telecoms	Personal attendance at Lecture 10, with physical presence in the course and Q&A session with the tutor at the end of the lecture.
Day 2 Conclusions			

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7. TUTORS/INSTRUCTORS

Name of tutor(s)/instructor(s)	Title	Contact details
Prof. Dr. Toni Janevski	Professor Doctor	tonij@feit.ukim.edu.mk

8. TRAINING COURSE COORDINATION

Course coordinator	ITU coordinator
Name: Dr. Sylwester Laskowski Title: Doctor, Chief Training Specialist Email address: s.laskowski@il-pib.pl	Name: Célia Pellet Title: Associate Capacity Development officer Email address: ituacademy@itu.int

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