Erasmus+

Sci·Co+

High Professional Skills *for* Advanced Scientific Communication

EXPERT AUTHORING AND DESIGN OF SCI-CO+ MATERIALS

Refresher Course

info@scicoplus.org
www.scicoplus.org

Programma Erasmus+
Progetto:
SCI-CO+ Alte Competenze Professionali
per la Comunicazione Avanzata della Scienza
N. 2022-1-IT01-KA220-VET-000086033
Promotore:
Fondazione IDIS - Città della Scienza, Napoli (ITALIA)

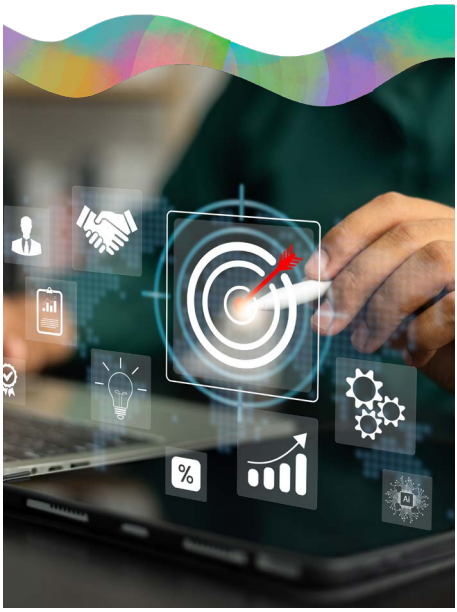
PROFESSIONAL PROFILE

The Expert in Authoring and Design of SciCo+ Materials is a technical expert in the design and development of science communication environments and materials based on the application of the SciCo+ Model and, in particular, the eSciCo Development Methodology.

This is not a professional computer scientist but an expert in the application of state-of-the-art IT tools, both hardware and software, to create advanced scientific communication environments that include, in particular, Web 2.0 technologies, the Internet of Things and artificial intelligence. This role will be able to realise communication solutions based, therefore, on the application of innovative technologies for user/visitor interaction (on-site, on-line, remote) through physical reality paths (3D scenography, medium immersivity, mono/multiuse), augmented reality on fixed and mobile platforms with high immersivity and with both single and multiple use, virtual reality in both physical and remote modes, geolocalisation, holography, up to the use of artificial intelligence, in particular to support linguistic communication and game development. Finally, they possess extensive skills in the use of social networks and distance learning technologies.

The Expert in Authoring and Design of SciCo+ Materials has competences in the development of advanced technological solutions both for scientific communication for information and cultural purposes (such as in Science Museums) and for training/educational purposes.

They are a figure with high ICT skills with specialisations in the use of 3D modelling and rendering tools, as well as advanced video editing tools.



OBJECTIVES

- Knowledge of digital technologies (Web 2.0, Internet of Things, Artificial Intelligence...)
- Ability to use advanced software to create innovativescientific communication environments
- Expertise in developing technological solutions to enable the completion of projects
- Ability to apply the SciCo+ model in the production of science dissemination materials

COURSE DESCRIPTION

This refresher course is aimed at professionals interested in perfecting their skills in authoring and designing educational and multimedia materials. The training offers tools and methodologies for the creation, development and management of educational and information content, with a focus on the integration of advanced technologies, such as e-learning platforms, interactive tools and digital media.

Participants will learn how to design materials that are effective, engaging and easy to use, adapting content to different formats and audiences. The course will also provide skills in the use of authoring software, visual design techniques and strategies for multimedia project management, ensuring a systematic approach to the production of innovative and quality materials.

The modules of the course are:

- Science Communication: analysing the main stages in the evolution of science communication up to digital communication and all its main forms;

- Methodologies and Technologies for Digital Innovation: describes and trains on the main methodologies and technologies of digital science communication;

- Expert in Authoring and Design of SciCO+ Materials: create and design digital and innovative materials combining science and communication for effective dissemination.

The course is based on an experimental teaching model with synchronous and asynchronous (live and self-learning) activities and innovative formats.

The formats of the activities are:

- **Recorded lecture and discussion:**

lecture recorded. Students listen beforehand, and then meet to have a discussion online.

- **Recorded lecture and exercises:**

lecture recorded. Students listen beforehand, and then meet do exercises online.

- **Self/individual studies and discussions:**

students will study materials from the library, and then take part in a live, online discussion.

WHEN

The course will run from October 2024 to January 2025.

TEACHERS

The lectures will be delivered by teachers and experts from the partner structures:

- Fondazione Idis-Città della Scienza
- Ciencia Viva
- Trinity College Dublin
- National University of Science and Technology Politehnica of Bucharest
- Navet Science Centre
- Fondazione Mondo Digitale
- High Technology District for Cultural Heritage Consortium
- Social Sciences Department, Università degli Studi di Napoli Federico II

FOR INFO AND CONTACT

For course information, contact info@scicoplus.org

PROOF OF ACTIVITY

Participants will be awarded digital certification on the Open Badge platform relating to the activities carried out.

The Open Badge is a digital certification attesting to the presence/knowledge/qualification acquired through an experience and/or through an in-presence and/or online training activity.

Sci·Co+ **High Professional Skills** *for* Advanced Scientific Communication

This brochure is part of the Project "SCI-CO+ - High Professional Skills for Advanced Science Communication" (Agreement No. 2022-1-IT01-KA220-VET-000086033), funded under the European Erasmus+ Programme.
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Sustainability is at the heart of the European Union's programs. The SCI-CO+ Project adopts environmentally friendly solutions. This brochure is printed in a limited number of copies for information purposes. The electronic version is available on www.SciCoPlus.org and www.SciCoPlus.eu.

The course takes place as part of the SCI-CO+ project, implemented within the framework of the European Eramus+ programme in partnership with eight organisations from five European countries.

SCI-CO+ Project has the general purpose of contributing, in an effective way, to the digital changes of a central sector for the cultural, social and economic development of the European Union and its individual Member States: the Communication of Science.

EXPERT AUTHORING AND DESIDN OF SCI-CO+ MATERIALS

Refresher Course

MODULE 1 SCIENCE COMMUNICATION

1.1 Introduction to Science Communication
a cura di Trinity College

1.2 Inclusive Science Communication
a cura di Trinity College

1.3 Initiatives - ideas and limitations
a cura di Sciencia Viva

1.4 Developing Strategies and Communication Plans for Effective Science Communication
a cura di Fondazione Mondo Digitale

1.5 Exhibitions planning&natural science for contemporary challenges
a cura della Fondazione Idis-Città della Scienza

1.6 Ciência Viva Journeys - a scientific tourism app
a cura di Ciencia Viva

1.7 Intersection between Design and Digital
a cura di Università degli Studi di Napoli Federico II

1.8 Accounting for the ecological issue

MODULE 2

METHODOLOGIES AND TECHNOLOGIES FOR DIGITAL INNOVATION

2.1 Coding and Computational Thinking
a cura della Fondazione Idis-Città della Scienza

2.2 Arduino and IoT for Science Communication
a cura della Fondazione Mondo Digitale

2.3 State of the art on technologies for advanced fruition in cultural heritage context
a cura di Databenc

2.4 Integrated study on augmented and virtual reality
a cura di Databenc

2.5 ChatGPT for Science Communication Digital
a cura della Università degli Studi di Napoli Federico II

2.6 Artificial Intelligence as an advanced method of fruition
a cura di Databenc

MODULE 3

EXPERT IN AUTHORING AND DESIGN OF SCICO+ MATERIALS

3.1 The Metaverse
a cura di Databenc

3.2 The NFTs
a cura di Databenc

3.3 The Holography
a cura di Databenc, UPB

3.4 Basic Elements of Programming in Python
a cura di UPB

3.5 NumPy Package and Classes and Objects
a cura di UPB

3.6 Big Data Analytics and Machine Learning
a cura di UPB

3.7 Neural Networks
a cura di UPB

MODULE 1 SCIENCE COMMUNICATION

Introduction to Science Communication

FORMAT Recorded presentation

AUTHORS Joseph Roche, Aoife Taylor

LEAD BY Trinity College Dublin

DESCRIPTION

This lesson explores the diverse ways we define and understand science communication. It begins by posing the question, "What is science communication?", exploring examples of art-science collaboration to illustrate its breadth. Through a conversation between Joseph Roche and Aoife Taylor, learners will delve into key theoretical concepts that shape this evolving discipline. The lesson encourages learners to reflect on their own science communication practices and the various forms they take. By the end, participants will have a foundational understanding of science communication, serving as a stepping stone for deeper exploration in future SciCo+ modules.

SPEAKERS PROFILE

Joseph Roche *is a researcher and lecturer at Trinity College Dublin. He leads international research projects investigating the role of science in society. He has worked at NASA and is a visiting scholar at Harvard. He is a Fellow of Trinity College Dublin and is the author of the textbook "Essential Skills for Early Career Researchers". Joseph leads the Science & Society research group at Trinity College.*

Aoife Taylor *is a Research Project Manager and Doctoral Student at the Science and Society Research Group in Trinity College Dublin, where her work focuses around science communication, citizen science and inclusion. She has an MSc in Astronomy and Science Communication and has experience working in art-science spaces. She acts as the Trinity College Dublin representative on the SciCo+ project.*

Inclusive Science Communication

FORMAT Recorded presentation

AUTHORS Aoife Taylor, Joseph Roche

LEAD BY Trinity College Dublin

DESCRIPTION

Improving the inclusivity of our science communication endeavours has become an important topic within the discipline. But how can we ensure that this change is meaningful, rather than just a tick-the-box approach? Aoife Taylor, in conversation with Joseph Roche, will present her own journey in trying to become a more inclusive science communicator, introducing the key players and advocates leading the movement, and concepts that have helped guide her in restructuring her own practice.

SPEAKERS PROFILE

Joseph Roche *is a researcher and lecturer at Trinity College Dublin. He leads international research projects investigating the role of science in society. He has worked at NASA and is a visiting scholar at Harvard. He is a Fellow of Trinity College Dublin and is the author of the textbook "Essential Skills for Early Career Researchers". Joseph leads the Science & Society research group at Trinity College.*

Aoife Taylor *is a Research Project Manager and Doctoral Student at the Science and Society Research Group in Trinity College Dublin, where her work focuses around science communication, citizen science and inclusion. She has an MSc in Astronomy and Science Communication and has experience working in art-science spaces. She acts as the Trinity College Dublin representative on the SciCo+ project.*

Science communications initiatives - a case study

FORMAT Presentation

AUTHORS Miguel Esperança

LEAD BY Ciência Viva – National Agency for Scientific and Technological Culture

DESCRIPTION

Though considered a recent field, Science Communication is a rich and vast area, which can be looked at from different lens and perspectives. In this lesson, the students will look at the etymological origin of science, in order to dive into some of the aspects of this discipline and the possibilities of communicating them. Afterwards, there are given some guidelines and considerations to bear in mind when designing and implementing a science communication initiative, illustrated with a real example of a successful one carried out by the Programming and Scientific Culture Unit of the Pavilion of Knowledge – Ciência Viva Science Centre.

SPEAKERS PROFILE

Miguel Esperança *is a project assistant assigned at ESERO Portugal, a partnership between Ciência Viva and the European Space Agency. He has a degree in Cellular and Molecular Biology and a post-graduate degree in Science Communication, an area in which he has been developing various national and European initiatives at the Pavilion of Knowledge, in Lisbon.*
Contact: mesperanca@cienciaviva.pt

Developing Strategies and Communication Plans for Effective Science Communication

Strategic Science Communication: Crafting Plans for Maximum Outreach and Engagement

FORMAT Slides with text and video

AUTHORS Susanna Bulgheroni

LEAD BY Fondazione Mondo Digitale

DESCRIPTION

Effective science communication requires more than just sharing information; it demands strategic planning to ensure that messages reach and resonate with the intended audience. This module equips students with the tools and techniques to develop comprehensive communication strategies tailored to specific scientific goals.

Participants will learn how to identify target audiences, set clear communication objectives, and choose the most effective channels and tactics for disseminating scientific content. The workshop will cover the key elements of a communication plan, including audience analysis, message development, media selection, and evaluation metrics.

SPEAKERS PROFILE

Susanna Bulgheroni *is a trainer at Fondazione Mondo Digitale, with a degree in Communication and Marketing and a specialization in Digital & Social Media Marketing, achieved through courses led by top global professionals. She has years of experience collaborating with public, private, and international organizations, as well as working as an external consultant for an international consulting firm. Since 2013, she has specialized in Social Media Marketing, supporting private individuals, small businesses, and SMEs. Over the years, she has transitioned from Social Media Manager to Social Media Specialist, expanding her expertise to an international context through consulting and training for organizations, industries, and global clients. Since 2019, Susanna has been actively involved in training on Social Media Marketing for private schools, foundations, and companies.*

VIRTUAL EXHIBITION "Viral Passion"

FORMAT Immersive visit

AUTHORS Arch. Luca Mosele, Communication Area Coordinator of Città della Scienza

LEAD BY Fondazione Idis - Città della Scienza

DESCRIPTION

VIRAL PASSION is a completely virtual exhibition conceived during the health emergency caused by the coronavirus pandemic, with the intent of offering visitors, through fascinating three-dimensional graphic representations, a view of the world of viruses, infinitesimal particles invisible to the human eye.

The virtual exhibition, designed by Luigi Amodio, Director of the Science Centre of Città della Scienza until September 2024, was planned, created, and developed in virtual form by Architect Luca Mosele. It is configured as an authentic exhibition, in which the use of white walls is deliberately divided into different thematic areas. In addition to textual information (ref. Luigi Amodio), particular attention has been paid to creating a visually engaging environment through a zenithal lighting system that has also contributed to generating a scenographic exhibition setup.

The Virtual Exhibition was conceived within the Space of Città della Scienza, specifically in the "Marie Curie Pavilion," which has been virtually reconstructed in all its material components, from the brick floor to the ceiling structures made with wooden trusses.

Viral Passion therefore presents these microorganisms by analyzing their distinctive characteristics, the genetic material present (DNA or RNA), the dynamics of their replicative process, and the extraordinary capacity for mutation that distinguishes them.

This exhibition, arising from the historical urgency of the current period, aims more generally to draw attention to the importance of scientific research, highlighting the central role that science plays in our daily lives and in the history of humanity.

SPEAKERS PROFILE

Luca Mosele *Graduated in Architecture at the University of Naples Federico II and holds a second level master's degree in real and Virtual Archaeological Heritage between land and sea, obtained at UNISOB. He currently holds the role of Head of Communications at the Idis-Città della Scienza Foundation. His skills extend to the research of scientific contents and their translation into graphic works intended for editorial publications, brochures, websites, multimedia products and institutional campaigns. Furthermore, he deals with iconographic research and production and processing of high-quality images; design and creation of 2D/3D materials for multimedia and paper applications, such as brochures, posters and panels for scientific exhibitions, as well as animated videos. He is also an expert in the development of 3D rendering for scientific and institutional events, reconstructions of archaeological sites and historical finds, as well as managing video development including storyboard, editing, production and post-production.*

Ciencia Viva Journeys

FORMAT Presentation

AUTHORS Cláudia Montenegro

LEAD BY Ciência Viva – National Agency for Scientific and Technological Culture

DESCRIPTION

This lesson presents a scientific tourism program called Ciência Viva Journeys. Over the last 30 years, Ciência Viva has been launching Science Centres across the Portuguese territory, establishing an ever-growing network of partners. Currently, to explore the 20 science centres, this program offers a card, a guidebook and an app to fully enjoy all the contents of the centres and the history, gastronomy and landscape of the region where they are implemented. Dive deeper on the impact the Ciência Viva Journeys had on families and regional culture and learn how to design your own route specific for your institution or region.

SPEAKERS PROFILE

Miguel Esperança *is a project assistant assigned at ESERO Portugal, a partnership between Ciência Viva and the European Space Agency. He has a degree in Cellular and Molecular Biology and a post-graduate degree in Science Communication, an area in which he has been developing various national and European initiatives at the Pavilion of Knowledge, in Lisbon.*
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Intersection between design and digital technologies for scientific communication experience

FORMAT Video, photo and slides

AUTHORS Carla Langella

LEAD BY University of Naples “Federico II”

DESCRIPTION

The collaboration between design and digital technologies in the design of communication devices and scientific exhibits allows to integrate scientific skills and humanistic culture in order to achieve significant and memorable experiences, as well as scientifically rigorous.

Design strategies such as amplifying experience through multisensoriality, focusing on details, emotional and sensory preparation to the fruitive path, have become key tools to create authentic and personalized engagement to raise people’s awareness on scientific issues.

Digital technologies and social networks, as well as being tools to support the dissemination of knowledge and the use of scientific culture, can also stimulate people’s active participation in the production of scientific knowledge.

The projects developed for the exhibition explore the potential of digital technologies to transform scientific dissemination into an immersive and engaging experience. Through digital artefacts such as videos, animations, applications and multimedia installations, are proposed optical experiences that can enhance the perception and involvement of the public, making scientific phenomena understandable in a direct and intuitive way.

In this lesson, the author presents the scientific exhibitions in which design and digital technologies intersect.

SPEAKERS PROFILE

Carla Langella *Architect, Associate Professor of Industrial Design at the DiARC of University of Naples 'Federico II', currently teaching User Experience Design and Industrial Design. She coordinates since 2006 the Hybrid Design Lab, dedicated to mutual relations between design and biosciences with a particular interest in biomimetics, design-driven materials, design for health, and design of cultural experiences mediated by digital technologies. She has produced over one hundred publications including scientific papers, contributions to books, conference proceedings and monographs.*

Accounting for the ecological issue. Actors and discourses

FORMAT Slides with link to MOOC on "Federica Web Learning" and "Emma" Platforms

AUTHORS Dario Minervini

LEAD BY UNINA – University of Naples Federico II

DESCRIPTION

Who accounts for (and how) the ecological crisis? The lesson tries to answer this question with a focus on some conceptual categories to frame this general issue. A discussion about the consequences of an increasing systemic complexity featuring contemporary societies, and the potential risk of the incommunicability of the ecological crisis, opens this module. Then the dynamics changing the relationship between science and politics concerning the environmental debate will be discussed regarding the multiplication of discourses and controversies. The epistemic distance separating experience and expert discourse on the ecological crisis is another focal point of discussion in the teaching unit, which closes the first part with a reflection on how the contradictions between moral values, including that of environmental protection, which characterise the capitalist regulatory model of so-called advanced economy societies, are constantly being recomposed.
The lesson is connected with a series of asynchronous MOOC learning units about the two following specific issues:

1. Risk and Trust
(Lesson 2; Unit 1 - La Società del Rischio; 5. Riepilogando: dalla fiducia tradizionale all'incertezza contemporanea)
Link to Federica WebLearning Platform:
https://lms.federica.eu/mod/book/view.php?id=3233&chapterid=29857

2. Experts, professionalism, socio-environmental values
(Green professionalization and ethics: Lessons 1, 2, 3)
Link to EMMA Platform:
https://platform.europeanmoocs.eu/course_green_professionalization_and_

SPEAKERS PROFILE

Dario Minervini *is Associate Professor of Environmental Sociology at University of Naples Federico II, Department of Social Sciences, Italy.*
Contact: dario.minervini@unina.it

MODULE 2

METHODOLOGIES AND TECHNOLOGIES FOR DIGITAL INNOVATION

Coding and computational thinking

FORMAT Video and photo

AUTHORS Flora Di Martino

LEAD BY Fondazione Idis- Città della Scienza

DESCRIPTION

Digital competence implies the use of information technologies in a safe, critical and responsible way. One of the first steps towards the acquisition of digital skills is the application of coding and the development of computational thinking in school programming. Coding is a teaching method that helps children think creatively, stimulates their curiosity through what may apparently seem like just a game. Coding allows you to learn the basics of computer programming, teaches you how to "dialogue" with the computer, how to give commands to the machine in a simple and intuitive way. The secret lies in the method: little theory and a lot of practice. The goal is not to train a generation of future programmers, but to educate the little ones in computational thinking, which is the ability to solve problems – even complex ones – by applying logic, reasoning step by step on the best strategy to arrive at the solution. Computational thinking is the creative logical process that develops during coding activities. Approaching this logical process as early as childhood allows you to enhance children's logical skills and creative problem solving. It is defined as computational thinking because it uses procedures that are essential for programming robots, computers and in general of all machines that without detailed instructions cannot perform the required functions. Italy is one of the first countries in Europe to have experimented with coding at school, which should not be understood as a new teaching subject, but as a transversal and interdisciplinary teaching activity.

SPEAKERS PROFILE

Flora Di Martino *Graduated in Geological Sciences, after a collaboration with the Department of Geophysics and Volcanology of the University of Naples "Federico II", she has been working at the IDIS-Città della Scienza Foundation since 1999. She is currently in charge of the Educational Innovation Department and is dedicated to the development of activities on STEAM education for schools of all levels. Lecturer in several teacher training courses dedicated to innovative teaching methodologies and to the teaching of "Hand on" and "learning by doing". He has participated in national and European projects dedicated to informal education and science communication and has lectured at numerous conferences. He is project manager of Horizon2020 projects on Science and Society and Erasmus Plus projects on Science and Technology.*

Arduino and IoT for Science Communication: Basics, Configuration, and Applications Getting Started with Arduino IoT Cloud: Building Connected Devices Made Easy

FORMAT Slides with text and video

AUTHORS Federico Di Giacomo

LEAD BY Fondazione Mondo Digitale

DESCRIPTION

Galileo Galilei, the father of modern science, wrote "Science is the perception of the reality that surrounds us". This statement highlights the crucial importance of scientific communication in contemporary society, as it makes complex concepts accessible to the general public, stimulating the development of critical thinking. Today, in an era where digitalization permeates every aspect of our lives, coding stands out as an innovative and versatile tool, capable of revolutionizing and enhancing the way we convey scientific knowledge.

In this module we will explore the use of coding and new technology to create scientific communication experiences capable of engaging the public. Using various applications and programming languages, participants will learn to develop dynamic visualizations, real-time simulations and web applications that not only simplify the understanding of scientific concept, but make interaction with science an immersive, personalized and engaging experience. The module will underline the importance of telling "scientific stories" through code, promoting a communication that does not simply transmit information, but transforms complex concepts into tangible and engaging experiences for a wide range of audiences.

SPEAKERS PROFILE

Federico Di Giacomo *graduated in Astrophysics and Cosmology from the University of Bologna in 2013. Since 2015, he has been working at INAF, the National Institute for Astrophysics, focusing on education and outreach activities. Currently, he holds a research fellowship at the INAF Astronomical Observatory of Padua, where he is involved in the preservation and promotion of INAF's scientific heritage, as well as conducting various educational and outreach initiatives. His recent research includes the study of stellar catalogs produced in Padua in the mid-19th century. Federico has extensive experience as a planetarium specialist and is actively engaged in developing new activities and programs for planetariums. He is also a Trainer at Fondazione Mondo Digitale, where he contributes to projects that promote STEM education, scientific literacy, and the use of astronomy as a tool for learning and engagement.*

State of the art on technologies for advanced fruition in scientific and cultural heritage

FORMAT Slides with text and video

AUTHORS Alfredo Troiano, Marcella Di Marino

LEAD BY NetCom Group S.p.A.

DESCRIPTION

This lesson explores the transformative impact of advanced technologies on the preservation, accessibility, and communication of cultural heritage. As digital tools evolve, they offer unprecedented opportunities for museums, historical sites, and cultural institutions to engage wider audiences.

We will examine immersive technologies such as virtual reality (VR) and augmented reality (AR), which allow users to experience historical environments and artifacts in entirely new ways. Artificial intelligence (AI) and machine learning are also revolutionizing heritage research, enabling detailed reconstructions, automated translations of ancient texts, and enhanced conservation techniques. Additionally, we will discuss the role of interactive platforms, mobile applications, and 3D digitization in expanding public access to cultural assets. These innovations are not only reshaping visitor experiences but also redefining the way cultural narratives are communicated. A key focus will be on science communication, exploring how digital storytelling, gamification, and social media can bridge the gap between experts and the public, making cultural heritage more engaging and inclusive. By analyzing case studies and emerging trends, this lesson will provide insights into how technology can enhance the appreciation and preservation of our shared history.

SPEAKERS PROFILE

Marcella Di Marino *graduated in Data Science for Intelligent Systems in 2022 from the University of Naples Federico II.*

Her Master's thesis focused on object detection at the crime scene, combining artificial intelligence techniques with augmented reality. Her first professional experience was teaching mathematics and physics at a high school. She is currently working as a Data Scientist in the Innovation Group of the Research and Development department at Netcom Group, where she focuses on computer vision and projects involving augmented and virtual reality. In Netcom, her applications have been developed for both the Cultural Heritage and Agritech sectors. Her expertise includes data science, computer vision, artificial intelligence, augmented reality, and virtual reality.

Contact: m.dimarino@netcomgroup.eu

Alfredo Troiano *graduated in Computer Engineering and holds a PhD in Information and Communication Technologies and Engineering. He has over 25 years of experience in research and development activities and in managing national and international ICT projects (PON/POR, MIUR, ESA/ASI, EU programs). He possesses expertise in satellite and terrestrial network systems, software and ICT platform design and development, and cybersecurity. Since 2019, he has served as the technical director of the NetCom Group and is responsible for innovation. He is an adjunct professor at the University of Salerno, Department of Industrial Engineering, and currently teaches the course "Computer Science for Industry 4.0: Networking, Big Data Management, and Machine Learning." He is the company representative within the DATABENC consortium (High Technology District for Cultural Heritage), the cataloging and fruition platform DatabencArt, and the technical manager of numerous projects in the cultural heritage sector. He is the sole administrator of QuantumNet Srl, the first Italian startup in Quantum Computing.*

Contact: a.troiano@netcomgroup.eu

Integrated study on augmented and virtual reality

FORMAT Slides with text and video

AUTHORS Alfredo Troiano, Marcella Di Marino

LEAD BY NetCom Group S.p.A.

DESCRIPTION

This lesson explores how Augmented Reality (AR) and Virtual Reality (VR) are revolutionizing storytelling and cultural engagement through advanced technologies and innovative applications. We will examine the core technologies that power AR and VR, including tracking systems, spatial computing, and AI-driven enhancements that create immersive and interactive experiences. The discussion will also cover the latest devices, from headsets like the Meta Quest and HoloLens to mobile-based AR applications, highlighting their role in transforming the way users interact with cultural content.

Real-world case studies will demonstrate how AR and VR are being used in museums, historical sites, and educational projects to bring heritage to life. These examples will illustrate how immersive storytelling can enhance audience engagement and provide new ways to experience cultural narratives.The lesson will also feature a hands-on development session, introducing Unity as a key tool for creating AR and VR applications. A practical demonstration will guide participants through the integration of Vuforia, a leading AR library, into Unity to develop a functional augmented reality app. This will provide students with both theoretical knowledge and practical experience, equipping them with the skills to design and implement their own AR-based cultural applications.

SPEAKERS PROFILE

Marcella Di Marino *graduated in Data Science for Intelligent Systems in 2022 from the University of Naples Federico II.*

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Contact: a.troiano@netcomgroup.eu

The Integration of Generative AI - ChatGPT - in Science Communication: Innovation, Challenges and Opportunities

FORMAT Slides and Workshop

AUTHORS Monica Murero

LEAD BY UNINA – University of Naples Federico II

DESCRIPTION

The evolving landscape of Science Communication necessitates a sophisticated approach. With the advent of generative AI, new challenges and opportunities emerge to ensure that scientific messages are not only accurate but also comprehensible, effective and accessible to diverse audiences.
The lesson is designed to provide learners with the theoretical foundations and practical skills required to incorporate generative AI into the development of robust science communication strategies aligned with specific scientific/targeted goals. Participants will explore how generative AI - ChatGPT and the like - can be effectively utilized in the communication design to establish clear communication objectives, assist in creating contents, optimize the selection of media channels and dissemination techniques. Key topics and exercises include AI-driven message construction using generative AI technologies, and the application of AI in media selection and dissemination.
Learners will possess the ability to use and integrate generative AI in their communication plan and actions. They will be equipped to enhance the reach, clarity, and effectiveness of their scientific communications, ensuring that their work resonates with both specialized and broader audiences - i.e. museum visitors - while contributing to the advancement of public understanding of science.

SPEAKERS PROFILE

Monica Murero *is Associate Professor of "Communication and New Technologies", and "Digital Communication, Social Media, and Health" at the University of Naples Federico II - Department of Social Sciences, Italy.*
Contact: monica.murero@unina.i

Artificial Intelligence as an advanced method of fruition

FORMAT Slides with text and video

AUTHORS Alfredo Troiano, Marcella Di Marino

LEAD BY NetCom Group S.p.A.

DESCRIPTION

This lesson explores the fundamental principles of Artificial Intelligence (AI) and its impact on the way we interact with and interpret art. We will delve into key AI concepts such as machine learning, deep neural networks, natural language processing (NLP), and computer vision, examining how these technologies enable machines to analyze, generate, and enhance artistic and cultural experiences. A central theme will be how AI-driven tools, including chatbots, robotic guides, and recommender systems, are transforming the way audiences engage with museums, galleries, and digital art platforms. By understanding user preferences and behaviors, AI can personalize artistic experiences, recommend artworks based on individual tastes, and even assist in creative processes by generating or restoring artistic content. The lesson will also highlight the role of science communication in making AI applications more accessible to the public. We will explore how AI-powered storytelling, interactive installations, and digital assistants help bridge the gap between complex technology and cultural engagement. Ethical considerations, such as the role of AI in artistic authorship and the potential biases in algorithmic curation, will also be discussed. Through case studies and discussions, students will gain insights into how AI is shaping the perception and appreciation of art, while also considering the broader implications of integrating intelligent systems into cultural spaces.

SPEAKERS PROFILE

Marcella Di Marino *graduated in Data Science for Intelligent Systems in 2022 from the University of Naples Federico II.*
Her Master's thesis focused on object detection at the crime scene, combining artificial intelligence techniques with augmented reality. Her first professional experience was teaching mathematics and physics at a high school. She is currently working as a Data Scientist in the Innovation Group of the Research and Development department at Netcom Group, where she focuses on computer vision and projects involving augmented and virtual reality. In Netcom, her applications have been developed for both the Cultural Heritage and Agritech sectors. Her expertise includes data science, computer vision, artificial intelligence, augmented reality, and virtual reality.
Contact: m.dimarino@netcomgroup.eu

Alfredo Troiano *graduated in Computer Engineering and holds a PhD in Information and Communication Technologies and Engineering. He has over 25 years of experience in research and development activities and in managing national and international ICT projects (PON/POR, MIUR, ESA/ASI, EU programs). He possesses expertise in satellite and terrestrial network systems, software and ICT platform design and development, and cybersecurity. Since 2019, he has served as the technical director of the NetCom Group and is responsible for innovation. He is an adjunct professor at the University of Salerno, Department of Industrial Engineering, and currently teaches the course "Computer Science for Industry 4.0: Networking, Big Data Management, and Machine Learning." He is the company representative within the DATABENC consortium (High Technology District for Cultural Heritage), the cataloging and fruition platform DatabencArt, and the technical manager of numerous projects in the cultural heritage sector. He is the sole administrator of QuantumNet Srl, the first Italian startup in Quantum Computing.*
Contact: a.troiano@netcomgroup.eu

MODULE 3

EXPERT IN AUTHORING AND DESIGN OF SCICO+ MATERIALS

The Metaverse

FORMAT Slides with text and video

AUTHORS Alfredo Troiano, Marcella Di Marino

LEAD BY NetCom Group S.p.A.

DESCRIPTION

This lesson explores the metaverse as a dynamic, interconnected virtual space that is transforming the way we experience and interact with cultural heritage. We will begin by defining the metaverse, analyzing its various classifications, and examining its potential applications within museums, historical sites, and educational platforms. By understanding how virtual worlds, blockchain technology, and decentralized platforms shape digital cultural ecosystems, students will gain insights into the evolving landscape of immersive heritage experiences. A key focus will be on the role of Virtual Reality (VR) in metaverse environments, highlighting how advanced tools can be leveraged to recreate historical sites, host virtual exhibitions, and facilitate interactive storytelling. We will also explore how AI-driven avatars, real-time social interactions, and digital twin technologies contribute to a more engaging and participatory cultural experience. The lesson will emphasize the importance of science communication in making these emerging technologies accessible and meaningful to diverse audiences. We will discuss how virtual heritage spaces can enhance public engagement by bridging physical and digital realms, ensuring cultural narratives remain relevant in an increasingly digital world. In addition to theoretical discussions, a hands-on segment will introduce students to VR application design with metaverse integration. Using state-of-the-art development tools, participants will explore the process of creating interactive virtual environments that reimagine cultural storytelling. By the end of the session, students will have a comprehensive understanding of the metaverse's role in cultural heritage and the technical foundations required to design immersive experiences.

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Contact: a.troiano@netcomgroup.eu

The NFTs

FORMAT Slides with text and video

AUTHORS Alfredo Troiano, Marcella Di Marino

LEAD BY NetCom Group S.p.A.

DESCRIPTION

This lesson explores Non-Fungible Tokens (NFTs) and their growing influence in the digital world, with a particular focus on their applications in science communication and cultural heritage. We will begin by examining the origins of NFTs, tracing their evolution from early blockchain-based assets to their current role in art, collectibles, and intellectual property. By understanding the fundamental characteristics of NFTs—such as uniqueness, provenance, and immutability—we will uncover why they have become a powerful tool for digital ownership and content distribution. A key focus will be on how NFTs are being used in the realm of science communication, enabling researchers, museums, and educational institutions to create verifiable digital assets that enhance public engagement. We will explore applications such as NFT-authenticated scientific data, interactive educational experiences, and blockchain-based preservation of historical artifacts. These technologies open new possibilities for funding scientific research, protecting digital heritage, and fostering global collaboration in knowledge dissemination. The lesson will also address the ethical and environmental debates surrounding NFTs, including concerns about sustainability and the implications of tokenizing cultural and scientific knowledge. Through case studies and discussions, students will analyze both the potential and limitations of NFTs in cultural and scientific contexts. By the end of the session, participants will have a well-rounded understanding of how NFTs function, how they are transforming digital content ownership, and how they can be strategically applied to enhance science communication and cultural storytelling in innovative and engaging ways.

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The Holography

FORMAT Slides with text and video

AUTHORS Alfredo Troiano, Marcella Di Marino

LEAD BY NetCom Group S.p.A.

DESCRIPTION

This lesson delves into the fascinating world of holography, tracing its evolution from its theoretical foundations to its cutting-edge applications in art, education, and cultural heritage. We will explore the fundamental principles behind holography, including wave interference, laser technology, and light diffraction, to understand how threedimensional images are captured and projected. A key focus will be on the history of holography, from its early scientific breakthroughs to its integration into modern digital displays, interactive installations, and augmented reality experiences. We will analyze how holographic technology is being used in museums, science centers, and cultural exhibitions to bring historical artifacts, scientific concepts, and artistic creations to life. By enabling audiences to visualize and interact with digital content in a more immersive way, holography is redefining storytelling and knowledge dissemination. The lesson will also examine the role of science communication in making holography accessible to the public. We will discuss how holographic projections are used in educational outreach, virtual performances, and even AIpowered digital humans, helping bridge the gap between complex scientific concepts and engaging audience experiences. Through real-world case studies and hands-on demonstrations, students will gain insights into how holography is shaping the future of immersive media. By the end of the session, participants will have a deeper understanding of how holography enhances cultural engagement, revolutionizes visual storytelling, and serves as a powerful tool for communicating science and history in innovative ways.

SPEAKERS PROFILE

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Basic Elements of Programming in Python

FORMAT Recorded lecture

AUTHORS Cristian Tarbă

LEAD BY Politehnica University of Bucharest

DESCRIPTION

Python is a high-level, interpreted programming language known for its readability and simplicity, making it accessible for beginners and powerful for experts. It supports multiple programming paradigms, including procedural, object-oriented, and functional programming, and has a vast ecosystem of libraries and frameworks for various applications.

The aim of this lecture is to present the student how to set up the virtual environment to have it ready for using Python as a programming language to solve basic tasks such as defining variables with different data type: Integers, Floats, Lists, Tuples, Sets, Dictionaries and use them to manipulate strings. There will be also presented how one can read and write data to files using specfic modules such as os and sys.

SPEAKERS PROFILE

Cristian Tarbă *Lecturer, PhD, National University of Science and Technology POLITEHNICA Bucharest. He has more than 20 years teaching experience in fields like computer programming, databases, project management, computer aided design/manufacturing. He participated as a team member in 10 projects related to research or e-learning and VET (7 national-funded projects and 3 European-funded projects). He was the manager for UPB of two completed Erasmus+ projects and manages a new one on HED. cristian.tarba@upb.ro*

The numpy Package
Classes and Objects

FORMAT Recorded lecture

AUTHORS Cristian Tarbă

LEAD BY Politehnica University of Bucharest

DESCRIPTION

NumPy is a powerful Python library used for numerical computing, providing support for large, multi-dimensional arrays and matrices, along with a collection of mathematical functions to operate on them. It serves as the foundation for many other scientific computing libraries in Python, enabling efficient data manipulation and analysis.

During this module the student will learn how to install numpy library and use it to manipulate large sets of data, using vectors and multi-dimensional arrays in vectorized operations, generally implemented through NumPy's universal functions (ufuncs), unary and binary. The student will learn also to use NumPy's broadcasting functionality. Broadcasting is set of rules for applying binary ufuncs (addition, subtraction, multiplication, etc.) on arrays of different sizes.

Object-Oriented Programming (OOP) is a programming paradigm that organizes software design around data, or objects, rather than functions and logic. It encapsulates data and behavior into classes, allowing for concepts such as inheritance, encapsulation, and polymorphism, which promote code reusability, modularity, and easier maintenance. The student will learn how to define classes, attributes and methods. There will be presented how instantiate the classes and perform some opperations with them.

SPEAKERS PROFILE

Cristian Tarbă *Lecturer, PhD, National University of Science and Technology POLITEHNICA Bucharest. He has more than 20 years teaching experience in fields like computer programming, databases, project management, computer aided design/manufacturing. He participated as a team member in 10 projects related to research or e-learning and VET (7 national-funded projects and 3 European-funded projects). He was the manager for UPB of two completed Erasmus+ projects and manages a new one on HED. cristian.tarba@upb.ro*

Big Data Analytics and Machine Learning

FORMAT Presentation for Self-Study

AUTHORS Cristian Tarbă

LEAD BY Politehnica University of Bucharest

DESCRIPTION

Big Data Analytics refers to the process of examining large and complex datasets to uncover hidden patterns, correlations, and insights. Machine learning is a subset of artificial intelligence that enables systems to learn from data and improve their performance over time without explicit programming. It involves algorithms and statistical models that identify patterns and make predictions based on input data, with applications in various fields like finance, healthcare, and marketing.

The module of Big Data Analytics and Machine Learnig will consist in how to use k-Nearest Neighbors (KNN) and Naive Bayes (NB) algorithms to solve the problems of flowers classfification (KNN) and detecting spam in email messages (NB).

SPEAKERS PROFILE

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Neural Networks

FORMAT Blended learning, Lecture (Video Lectures and Interactive Presentations) and exercises

AUTHORS Bogdan Abaza

LEAD BY UNSTPB-Politehnica University of Bucharest

DESCRIPTION

This course is tailored for professionals aiming to become experts in authoring and designing advanced science communication materials using neural network technologies. Participants will explore how neural networks, as a cornerstone of artificial intelligence, can be utilized to effectively translate scientific knowledge, processes, strategies, and languages into impactful, engaging science communication tools. By focusing on design, development, and scripting, this course equips participants with the skills to transform complex scientific concepts into accessible materials through the power of AI.

SPEAKERS PROFILE

Bogdan Abaza *is Associate Professor of Faculty Industrial Engineering and Robotics from Politehnica University of Bucharest. Advance experience in teaching and developing Artificial Intelligence Systems Applied in Engineering (autonomous robots, manufacturing processes). He managed European projects where he coordinated the development of web based tools integrated in online assessments platforms in European projects like eGUIDE, AppsEguide (tools for assessment of Interest, Personality and Cognitive Abilities), KnowHow (tools for assessment of Learning Styles, Learning Skills and Learning Strengths) and FYC Future-proof Your Career – career guidance for a modern labour market (online platform with tools for capturing relevant competencies through everyday activities, which are needed in the new world of work). He was involved in more than 45 European projects related to e-learning and Vocational Training. Advanced experience in coordinating and development of VET oriented Web portals and online platforms.*

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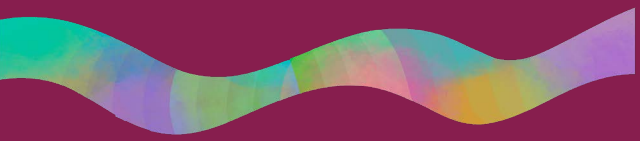
Sci·Co+

High Professional Skills *for* Advanced Scientific Communication



Program Erasmus+ – Cooperation Partnership – Key Action KA220

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