

DARE
DIGITAL LIFELONG PREVENTION
CODE NO. PNC0000002

Spoke 3 Deliverable
**WP6 Education and Training on
digital skills in healthcare**

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S3.D6.2 Plan for Advanced Training Courses

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Table of contents

Table of contents	4
1. Advanced training activities	5
1.1. Training activities for newly hired and DARE workforce	5
1.2. Educational platform and certifications	7

1. Advanced training activities

WP6, “Education, Training and Career Pathways”, will coordinate training and retraining activities of the DARE with the purpose of improving digital skills and qualified employees in the field of secondary and tertiary health prevention.

Task 6.2, “Professional retraining and advanced training courses”, has the aim to improve knowledge in translation of biological principles into technology as well as artificial intelligence and deep learning techniques.

The target group includes Ph.D. and master’s students from the contributing beneficiaries of SP 1-2-3, the current workforce of the DARE project and the newly hired one.

The educational plan is developed dynamically with the readiness of updating topics if needs related to DARE project emerge. The contents of the newly developed activities are planned by a Scientific committee to propose a detailed syllabus and to identify the lecturers.

1.1. Training activities for newly hired and DARE workforce

The training activities promoted by DARE partners will be developed. The general target is the DARE workforce and newly hired personnel. Some activities can also be open to the public, Ph.D. and Master students with a career path coherent with dare objectives:

- **Seminars on the technological and ethical aspects of digital prevention.** A series of seminars related to the general aspects of the DARE project will be offered mainly by Spoke 1 members. The goal is to make everybody in DARE aware of the different aspects to which the various work packages are committed to contributing. A seminar catalogue has already been developed, and the seminar series will start in January 2024. The seminars will be delivered in the present and online and will also be recorded with the aim of constituting a DARE seminar library.
- **Artificial Intelligence and Deep Learning with Applications in Life Science.** This 15-hour course, provided by UNIROMA2, offers an intensive introduction to artificial intelligence and deep learning techniques guiding participants through the most important and recent elements of the discipline. The course focuses on creating and using deep neural networks for processing complex data, from imaging and

biomedical signals to textual data, and applications in radiotherapy and nuclear medicine. Participants will gain advanced skills in programming and mathematics, applicable in physics and biomedical contexts. The curriculum covers a range of topics, including machine learning models, neural networks, data preparation, supervised and unsupervised learning, and advanced deep learning techniques like reinforcement learning and spiking neural networks.

- **Introduction to Neuromorphic Computing.** This Ph.D. course, offered by UNIROMA2, delves into the emerging field of neuromorphic computing. It explores the translation of biological principles into technology, specifically focusing on spiking neural networks and neuromorphic architectures as foundations for next-generation AI. Topics include neuronal membrane potential dynamics, neuroanatomy, chemical neuromodulation, neural tissue energy demands, evolutionary theory, and cognition principles. Prerequisites include key machine learning concepts.
- **Deep Learning for Biomedical Images.** This Ph.D course is provided by UNIPD. The rapid evolution of deep learning in the field of computer vision provided state-of-the-art solutions for classical tasks such as object detection, classification, segmentation, and activity recognition. This course provides students the knowledge and the practical skills to understand the most recent deep learning tools for images and to use them in the field of biomedical imaging.
- **Artificial intelligence applied to the study of storage diseases in the context of monoclonal gammopathies (Gaucher disease, Fabry disease),** provided by UNIBA.
- **Artificial intelligence and multivariate statistics applied to clinical psychology and personalized psychiatry,** provided by UNIBA.
- **Artificial intelligence in medical imaging.** Overview of AI key applications in radiology, specifically in screening programs provided by UNIPA. This part will focus on common tasks, including automated detection and diagnosis, image segmentation and workflow optimization.
- **Radiomics and Machine Learning.** This course, provided by UNIPA, has the aim to explore the role of radiomics in ML models to predict and classify specific conditions, contributing to improved diagnostic accuracy and personalized treatment strategies.

- **Big Data in oncology: genomic analysis and bioinformatics.** This course, provided by UNIPA, has the aim to introduce the Next Generation Sequencing (NGS) technologies and standard bioinformatic analysis to study the mutational landscape of cancer. From basic analysis such as mutation co-occurrence or mutual exclusivity to more advanced ML-based applications.

1.2. Educational platform and certifications

The design and the implementation of the education, research, and career pathways will take into account blended delivery systems through a specific learning environment called “LearningFlix” provided by partner BI-REX.

Didactic multimedia approaches will be adopted including innovative teaching strategies involving collaborative learning, debates, case studies, simulations and live interaction with learners.

These pathways will be certified through the ECTS system and also micro-credentials and open badges for shorter courses that can be shared, portable and combined into larger credentials.

ECTS credits will be provided where appropriate.