EUTEMPE Module 11: Artificial Intelligence in Patient Dosimetry for X-ray Diagnostic and Therapeutic Imaging

Module description

This intensive EUTEMPE module is designed to provide participants with a comprehensive understanding of the application of Artificial Intelligence (AI) in patient dosimetry for X-ray diagnostic and therapeutic imaging. Participants will gain hands-on experience with AI tools and algorithms used in medical X-ray dosimetry, explore the integration of AI into clinical workflows, and discuss the ethical and regulatory considerations of AI in medical imaging. The course will also highlight the latest research trends and future directions in AI-driven dosimetry.

Key topics include patient dose estimation methods for X-ray diagnostic and therapeutic imaging – dose management of patients (adult/paediatric/pregnant) - basics of AI - machine learning and deep learning workflow - introduction to AI tools: Python, AI libraries, Google Colab - data preprocessing - building an AI model for image segmentation - building an AI model for patient organ dose estimation - training a denoising autoencoder to enhance low-dose images - AI model validation and performance metrics – use of an AI-powered tool (iDose) - regulatory, ethical, and legal aspects of AI - research challenges and opportunities.

Learning Objectives:

By the end of the course, participants will be able to:

- Acquire deep knowledge in patient dosimetry in diagnostic and therapeutic X-ray imaging
- Review the current limitations of conventional dosimetry methods
- Understand patient dose management processes
- Explore the concepts of AI and machine learning
- Learn how to acquire, preprocess, and analyze medical imaging data for AI model development
- Develop and validate AI models for patient dosimetry using real-world datasets
- Apply AI-powered tools to assess and optimize patient doses in real-world clinical scenarios
- Discuss regulatory, ethical, and validation challenges in the clinical adoption of AI in dosimetry

Start online course: July 14, 2025

Face-to-face course (Heraklion, Crete, Greece):

September 1, 2025 - September 5, 2025

Target Audience:

This course is ideal for medical physicists. It is also very useful for healthcare professionals involved in medical imaging, radiation protection, and patient safety.

Teaching Methods:

- Expert lectures and keynote presentations
- Hands-on workshops with AI tools and dosimetry software
- Group exercises and case-based learning
- Panel discussions with experts from medical physics and AI fields
- Course material (slides, articles, etc.) provided electronically

Prerequisites:

- Good understanding of dosimetry in X-ray imaging
- Familiarity with computer programming (e.g., Python) is beneficial but not required

Course Format:

- Lectures
- Hands-on Workshops
- Case Studies
- Group Discussions
- Q&A Sessions

Registration fee: € 700. Reduced registration fee (€ 370) is available upon request for the first 6 applicants per module from the following countries Albania, Belarus, Bosnia Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Kosovo, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey, Ukraine, UN list of least developed countries.