Health sector skill alliance for creating innovative and efficient VET programmes and improving the digital skills of medical physics and health professionals

DIGI4ME

WP3 Development of innovative educational content, methodologies, curriculum and courses

O3.1 Curriculum for digital skills of health professionals

Primary Contributors

Foteini Grivokostopoulou

Andreas Kanavos

Final Version

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Abstract:	We will develop a new curriculum, based on the results of WP2 and formulate an innovative, state of the art didactic framework. We will design and develop the curriculum for a brand new qualification to meet the needs of Health Professionals across EU. It aims at stimulating digital skills, fostering ICT technologies in health domain, and supporting VET students with digital skills. The VET program is divided into four curricula: Digital Technology, Health Data Science, Healthcare & Safety and transversal skills curriculum.

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DIGI4ME Project Consortium

Role	Name	Country
Coordinator	University of Patras	Greece
Partner	Computer Technology Institute	Greece
Partner	Hochschule 21	Germany
Partner	International Network for Health Workforce Education	Cyprus
Partner	University of Cyprus	Cyprus
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1. Introduction

The overall aim of DIGI4ME (Health sector skill alliance for creating innovative and efficient VET programmes and improving the digital Skills of medical physics and health professionals) is to enhance digital skills training in the health care sector as well as educational institutes, VET centres, health care associations and research institutes. The project will promote exchange of skills, experience and accessibility which will be embodied in a single high quality training framework to improve Digital Skill training all over Europe. The increasing demand for healthcare services, driven by the demographic shifts throughout Europe, will increase the number of jobs and the required skills of professionals in the health sector. The health sector will have a 23% increase in employment by 2025 and the skills that health professionals possess are a key determinant in the delivery of high-quality services to wider society. The quality and competency of digital skills of healthcare professionals are acknowledged to be of extreme importance at EU level.

The project will define the educational content by determining the digital skills that every health professional must possess to use eHealth solutions. This process will involve verification of the specific educational needs of doctors and other professionals of digital technology of medical imaging equipment.

The DIGI4ME project has as main aim to address the gap in skills of the health sector workforce and provide an innovative training framework among with a certification scheme. The project will address EQF levels up to 4. It will formulate a wide spectrum of courses for enhancing the skills of health professionals. Novel curricula addressing state of the art methods and contents in health sector will be formulated. All the educational material and the courses will be available for free as OER in the web VOOC system that will be created and interested users could assess them and enrol in the courses. Then partners will develop user-adapted training modules on the specific context concerning digital image processing and administration, including recent changes to the pedagogical landscape of healthcare distance learning with the use of an innovative Vocational Open Online Courses (VOOCs) for Digital Skills. After an evaluation of the functionality of the educational tools through the pilot study over 4 EU countries. After testing and the educational framework will be accredited using the appropriate EU directives and national agencies.

2. Structure of the document

The scope of the deliverable is present the curriculum of the VET program that will be delivered to medical physics and health professionals. The VET program is divided into four curricula: Digital Technology, Health Data Science, Healthcare & Safety and Transversal Skills.

The structure of the Curriculum for digital skills of health professionals is as follows:

- Section 3 describes the methodology for Digi4Me VET Curriculum and the health modules.
- Section 4 describes the Digital technology course and the corresponding modules.
- Section 5 describes the Health Data Science (HDS) course and the corresponding modules.
- Section 6 describes the Healthcare & Safety (HS) course and the corresponding modules.
- Section 7 describes the Transversal Skills (TS) course.

3. Methodology for Digi4Me VET Curriculum

Constructive alignment (CA) (Biggs, 1996& Biggs, 2014) approach is the foundation of the methodology used to design Digi4Me VET curriculum. Constructive alignment (CA) is an outcomes-based approach to teaching in which the learning outcomes that students are intended to achieve are defined before teaching takes place. Teaching and assessment methods are then designed to best achieve those outcomes and to assess the standard at which they have been achieved.

"Constructive alignment is a design for teaching in which what it is intended students should learn and how they should express their learning is clearly stated before teaching takes place. Teaching is then designed to engage students in learning activities that optimise their chances of achieving those outcomes, and assessment tasks are designed to enable clear judgments as to how well those outcomes have been attained" (Biggs, 2014, pp. 5-6).

The operational framework for this teaching design:

1. Identify the intended learning outcomes.
2. Design assessment tasks to measure attainment of the learning outcomes
3. Plan learning activities to enable students to develop the skills, knowledge and understandings described in the intended learning outcomes and measured by assessment
4. Choose the content required to support the learning activities

The development of curricula and expected learning outcomes is a dynamic cyclical process requiring reassessment and adaptation over time. The use of learning outcomes is increasingly influencing the design and delivery of vocational education and training (VET), focusing on what a learner is expected to know, be able to do, and understand at the end of a learning process. The shared focus on outcomes facilitates the dialogue between education and training and labour market actors, as well as across different education and training sub-systems. Similarly, the increased transparency offered by learning outcomes acts as an important reference point for several stakeholders: policy- makers, labour market actors and teachers, making it easier to analyse the match between skills demands and education and training provisions.

The curriculum for digital skills of health professionals consists of three stages:

1. Identification of Curriculum goals and Learning outcomes.
2. Development of teaching and assessment methods
3. Review and refine of the curriculum.
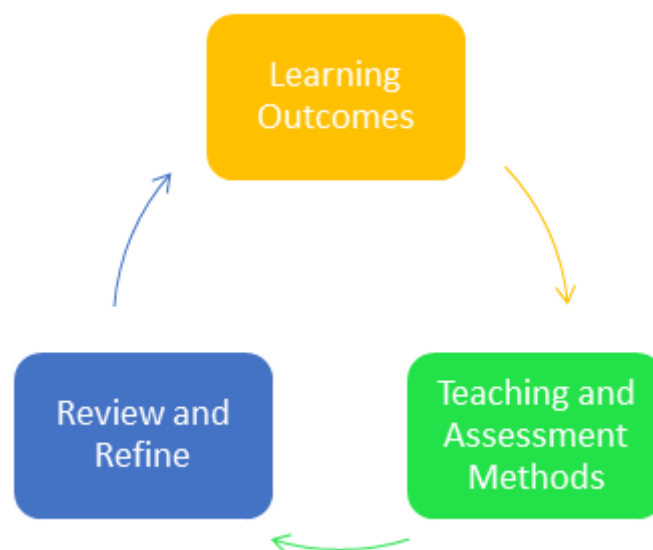
Figure 1 Development of the Health curriculum

Development of the teaching methods and assessment methods:

This stage consists of the tree phases of VET programs: online, face to face and work-based learning. The assessment methods should be in accordance with the learning outcomes of the module and should foster a deep approach to learning.

Review and refine of the VET curriculum.

The curriculum review cycle is defined as a systematic approach to evaluating, reviewing and revising VET curricular within a specific timeframe which aims to identify gaps and weaknesses with a view to increasing curriculum effectiveness and continually improving VET learner/student learning experiences.

3.1. Educational Modules

The participants based on their profiles will get personalized learning paths and modules that better fit their specialty, their knowledge background, and their professions.

Each health module will have three main parts: Introductory material, core material and advanced material. In following figure, the level for each health module is illustrated.
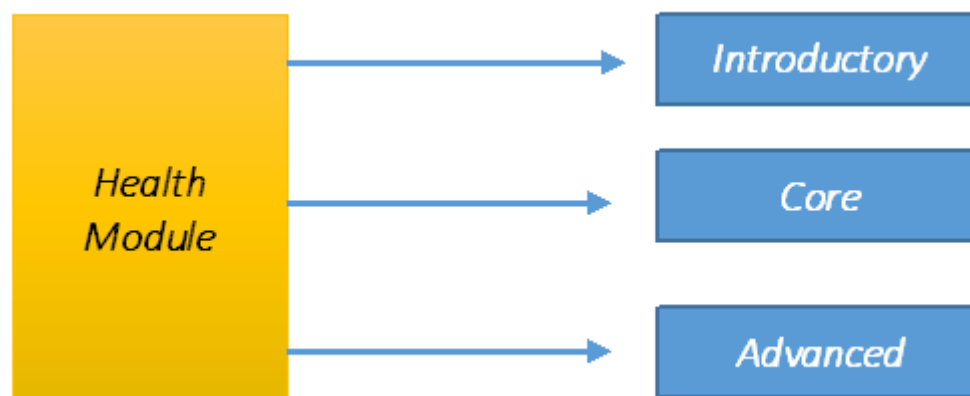
Figure 2 Levels for each Health Module

- **Introductory (I):** The educational module is introduced and its most important facts are given.
- **Core (C):** All core aspects, principles and methods of the module are covered

in sufficient detail as necessary to apply the knowledge and skills on the job. The learner becomes able to discuss matters with other stakeholders and acquire more knowledge when necessary.

- **Advanced (A):** Advanced aspects of the module are covered in sufficient detail. Also, each module consists of the following elements:

Objectives: The objectives of the training unit indicating its general direction or orientation in terms of its content.

Learning outcomes: The learning outcomes of the training unit are in terms of knowledge, skills and competences.

Content: The content of the training unit.

Learning methodologies: The learning methodologies applied for the delivery of the training unit.

Assessment methodologies: The methodologies applied for the assessment of the learning outcomes.

Duration: The duration of the training unit duration. The indicative duration of each training unit is as follows: (a) Introduction: 1 to 2 hours, Core: 4 hours to 10 hours and Advanced: 6 hours to 10 hours.

Pre-requisite: Pre-requisite knowledge and skills to attend the training unit

Each health module will consist of the specific objectives that it hast, the expected learning outcomes, the educational contents and the learning methodology adopted, the possible pre-requires to the topics and modules and also the assessment methodologies. The curriculum follows a modular approach to fit to the specific needs of each learner and permit to each learner to build its own learning path. It is structured by educational modules and training units.

4. Digital Technology (DT)

The Digital Technology (DT) Course consists of the following ten modules:

- Introduction to Digital Health (DH-DT1)

- Introduction to Medical Imaging (MI-DT2)

- 3D Modelling and 3D Printing (3D-DT3)

- Imaging Procedures (IP-DT4)

- Radiology (R-DT5)

- Digital X-Ray (DX-DT6)

- Ultrasound Technology (US-DT7)

- Technical Principles of Radiological Mammography (RM-DT8)

- Diagnostic Imaging (DI-DT9)

- Semiconductor Lasers (SL-DT10)

In figure 3 present the Digital Technology (DT) Module and training units.
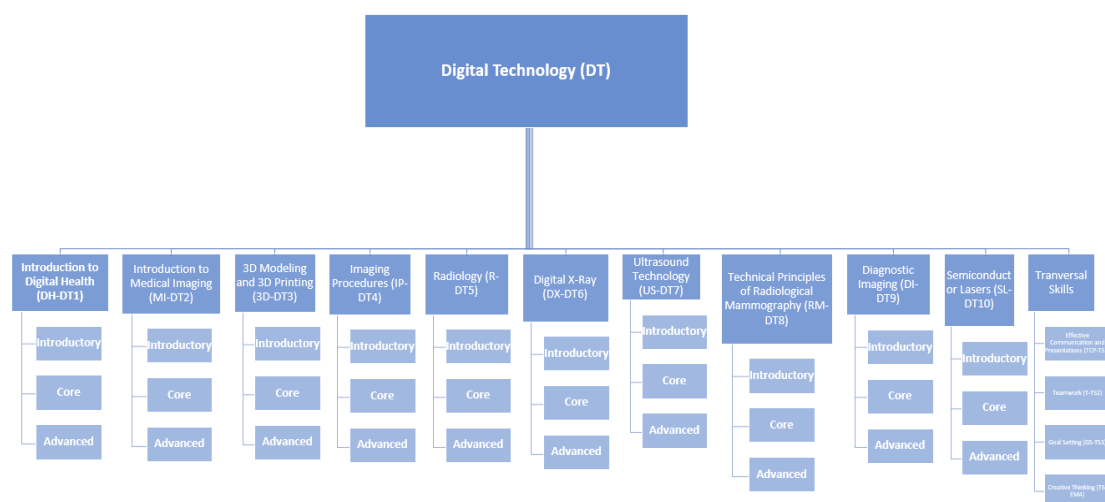
Figure 3 Digital Technology (DT) Module and training units

4.1 Introduction to Digital Health (DH-DT1)

Description: In this educational module learners will be introduced to digital health and its application at various disciplines. The aim of the educational module is to understand the learners what is the Digital health and the various kinds of activities that a Digital health performs. It will teach the learners about digital health technologies, the global distribution of these technologies that exist in terms of access to, and usage of, different forms of digital health technologies. Learners will complete quizzes to apply their newly acquired skills and knowledge.

4.1.1 Introduction to Digital Health (DH-DT1-I)-Introduction

Learning Outcomes

After the successful completion of this unit learners will (knowledge):

- Know the key concepts of Digital Health
- Describe the development of digital health technology in brief.
- know the different roles involved in Data Science project,
- Describe the many kinds of data that digital health technology generates or collect.

- Identify and describe key areas within digital health.
- Know the Key objectives and the benefits of digital health.

will be able to (skills):

- explain the key concepts of Digital Health
- identify the main domain of Digital Health
- identify the Key objectives and Global Strategy of Digital Health
- communicate the different tools used by Digital Health

and will (competences)

- To increase patient safety and health care quality the health care actioner will learn how to create a culture to integrate patient safety in his workplace.
- Therefore, it is necessary to improve the own knowledge continuously.

Content

- Introduction Digital Health
- Definition of Digital Health
- History of Digital Health
- Key objectives / benefits of Digital Health
- Global Strategy of Digital Health

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 1 Hour

Total ECVET Points: 0.04

4.1.2 Introduction to Digital Health (DH-DT1-C)-Core

Learning Outcomes

After the successful completion of this unit learners will (knowledge):

- Know the key concepts of Digital Health
- Describe the development of digital health technology in brief.
- know the different roles involved in Digital health project.
- Describe the many kinds of data that digital health technology generates or collect.
- Identify and describe key areas within digital health.
- Know the Key objectives and the benefits of digital health.

will be able to (skills):

- explain the key concepts of Digital Health

- identify the main domain of Digital Health

- identify the Key objectives and Global Strategy of Digital Health

- communicate the different tools used by Digital Health

- recognize the types of Digital health.

- find the difference m-Health and Telehealth
- support the main types of Digital Health.

and will (competences)

- be able to modernize traditional health systems by use digital health.

- be able to the benefits of digital health.

- be able to recognize the ways that digital health may impact healthcare around the world.

Content
- Introduction Digital Health
- Definition of Digital Health
- History of Digital Health
- Key objectives / benefits of Digital Health
- Global Strategy of Digital Health

Training Methods:
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 4 Hours

Total ECVET Points: 0.14

4.1.3 Introduction to Digital Health (DH-DT1-C)-Advanced

Learning Outcomes

After the successful completion of this unit learners will (knowledge):

- Know the health information system technologies and standards.
- learn Components of digital health.
- learn how HIS change healthcare delivery workflows and how to manage that change.
- understand privacy and security laws related to digital health.

will be able to (skills):

- demonstrate a basic understanding of the role of digitalization in such transformation process.
- recognize the impact of medical technologies in digital health transformation.
- recognize challenges on the road to digital health.

and will (competences)

- be able to recognize of health care, health information technology.
- be able to recognize the ways that digital health may impact healthcare around the world.
- be able to apply examples and practices of digital health.

Content

- Information systems

- Information systems in the field of health

- Hospital information system (HIS)

- Benefits

- The use of digital health

- Components of digital health

- Digital trends in health

- Data mining

- Data management

- Challenges on the road to digital health

- Political Framework

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hours

Total ECVET Points: 0.2

4.2 Introduction to Medical Imaging (MI-DT2)

Description:

In this educational module learners will be introduced to medical imaging and modern imaging modalities. The aim of the educational module is to give learners the basic scientific principals behind each modality, and introduces some of the key applications major medical imaging techniques in wide use in both medical practice and medical research, including Computed Tomography, Ultrasound, Positron Emission Tomography, Single Photon Emission Tomography and Magnetic Resonance Imaging. Learners will complete quizzes to apply their newly acquired skills and knowledge.

4.2.1 Introduction to Medical Imaging (MI-DT2-I)-Introduction

Learning Outcomes

After the successful completion of this unit learners will (knowledge):

- Know information from multiple imaging modalities.
- learn disease progression by monitoring changes in size, shape, position, or image intensity.

will be able to (skills):

- Apply medical imaging in clinical decision process.
- Diagnose, treat and cure patients without causing any harmful side effects.

and will (competences)

- be able to exploit by using Computer vision related to texture, shape, contour and prior knowledge along with contextual information from image sequence and provide information that helps with better human understanding
- be able to Increase competences to better understand pathologies based on specific medical diagnose through image analyse.

Content

- Definition of Medical image
- History of Medical image
- Importance of Medical Imaging

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hours

Total ECVET Points: 0.2

4.2.2 Introduction to Medical Imaging (MI-DT2-C)-Core

Learning Outcomes

After the successful completion of this unit learners will (knowledge):

- Understand of main modalities and diagnosis applications
- learn on digitized images and of the techniques to manipulated them by changing contrast and brightness or zoom in and out as well as the methods to store them in a secure file.

- learn to diagnose internal structures such as: bones, heart, lungs, and abdominal organs.
- learn how to provides high-resolution cross-sectional anatomical images by using CT.
- learn how to use magnetic fields and radio waves to diagnose diseases and injury of soft tissue b using MRI.
- understand basic information in nuclear medicine by using PET.
- understand transducer produces to diagnose abnormalities of internal soft organs.

will be able to (skills):

- Improve the skills of health professionals for better care and patient diagnosis by making use of techniques such as: Radiography, CT, MRI, ultrasound imaging, PET and SPECT
- Improve skills in studying disease progression by monitoring changes in size, shape, position, or image intensity over time.

and will (competences)

- be able to modernize diagnosis techniques.
- Provide information on better store and secure the patient's medical information secure files to permit to use available data of medical for shared decision in patient's diagnosis.

Content
- Medical Imaging Modalities
- Radiography
- Computed Tomography
- Magnetic Resonance Imaging
- Positron Emission Tomography
- Single Photon Emission Computed Tomography
- Ultrasound

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired*

skills and knowledge.

Total Training Hours**:** 4 Hours

Total ECVET Points: 0.14

4.2.3 Introduction to Medical Imaging (MI-DT2-I)-Advanced

Learning Outcomes

After the successful completion of this unit learners will (knowledge):

▪ Know the principle of Radiography X-Ray Production
▪ Know the differences and main applications for: Conventional radiography, computed and digital radiography.
▪ Know the principle of CT as a complex combination of various radiography at different angles to eliminate this superposition and display three-dimensional (3D) slices.
▪ know of multi slice CT – dose and acquisition time.
▪ learn the principle of magnetic fields and radio waves methods (MRI) to diagnose. diseases and injury of soft tissue, Classical and iterative reconstruction in CT.
▪ Know the MRI and principles of nuclear magnetic resonance (NMR)
▪ Know the basic principle in Single photon emission computed tomography (SPECT)
▪ Know the basic principle of Ultrasound and main application in medical imaging domain.

will be able to (skills):

▪ use the main Medical Imaging devices in studying and monitoring disease progression.

▪ to recognize the basic principle of the main medical imaging modalities in diseases surveillance and treatment.

and will (competences)

▪ Able to manipulate, store and analyses the information in patient's health surveillance.

▪ Able to create folders with patient's medical date to permit the analyse of their evolution in time and to use them to permit medical shared decision in patient's diagnosis and treatment.

Content

  Radiography X-Ray Production

Radiography

Computed Radiography

Digital Radiography

Quantification in Mammography

Dual-Energy X-Ray Absorptiometry

Multi slice CT – dose and acquisition time

Ultrasound

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hours

Total ECVET Points: 0.2

4.3 3D Modelling and 3D Printing (3D-DT3)

Description:

In this educational module learners will be introduced on 3D Modelling and 3D Printing. The aim of the educational module is to understand learners for the Open Source and Free 3D Slicer Software, extracting valuable patient-specific information from Patient CT/MRI Scans and converting them to 3D Models that provide an extra dimension to imaging. Also, the learners will be learning how to extract valuable patient specific information from Patient CT/MRI Scans, convert them to 3D Models that provide an extra dimension to imaging and how to prepare these files for 3D Printing, so the manufacturing process is seamless. Learners will complete quizzes to apply their newly acquired skills and knowledge.

4.3.1 3D Modelling and 3D Printing (3D-DT3-I)-Introduction

Learning Outcomes

After the successful completion of this unit learners will (knowledge):

- learn basic information of 3D printing.
- learn basic information of 3D Modelling.
- learn the medical 3D printing.
- learn the Concept of 3D printer.

will be able to (skills):

- recognize the basic principle of the 3D Printing.
- understand the basic principle of the 3D modelling.
- operate a 3D printer.

and will (competences)

- be able to theoretical skills and practice you need to 3D modelling.
- be able to skills related to 3D printing technologies.
- be able to know how to operate 3D printer.

Content
- What is 3D Modelling?
- What is 3D Printing?
- What is medical 3D printing?
- 3D Printer

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hours

Total ECVET Points: 0.2

4.3.2 3D Modelling and 3D Printing (3D-DT3-C)-Core

Learning Outcomes

After the successful completion of this unit learners will (knowledge):

- understand the Pros and the Cons of 3D Printing.

- learn the applications of 3D printing.

- understand different applications for 3D-printing and bioprinting in the health.

- understand the principles of bioprinting (layer-by-layer).

- understand the bioprinters.

- learn how to install and use 3D Printing and 3D modelling Software.

will be able to (skills):

- evaluate and analyse objects created by 3D-printing for use within the life sciences.
- create basic principle of bioprinting and a basic 3D-model with the help of software

- 3D printing and 3D modelling software for healthcare applications.
- Use 3D modelling software, learners will employ best practices for cleaning up and exporting a 3D model.

and will (competences)

- be able to get knowledge to related to 3D modelling and 3D printer.
- be able to get knowledge to related to Bioprinting and bioprinter
- be able to get knowledge to recognize different applications for 3D-printing and bioprinting in the health.
- be able to get knowledge to apply 3D modelling and 3D printing software
- be able to get knowledge to recognise opportunities within the healthcare sector for additive manufacturing or 3D printing.

Content

- Pros &Cons of 3D Printing

- 3D Printing Healthcare

- Medical application for 3D Printing

- 3D bioprinting

- Bioprinting Process

- 3D Printing Software

-

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hours

Total ECVET Points: 0.2

4.3.3 3D Modelling and 3D Printing (3D-DT3-A)-Advanced

Learning Outcomes

After the successful completion of this unit learners will (knowledge):

will be able to (skills):

- understand the basic principle of the 3D Printing.
- understand the basic principle of the 3D modelling.
- operate a 3D printer.

and will (competences)

- be able to theoretical skills and practice you need to 3D modelling.
- be able to skills related to 3D printing technologies.
- be able to the basic operation principles of 3D printing and to know how to operate 3D printer.

Content
- Practical Example in Health
- Teeth 3D Model
- OnDemand3D
- 3D Printing Materials
- STL Model

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.23

4.4 Imaging Procedures (IP-DT4)

Description:

In this educational module learners will be introduced to the concepts of imaging procedures. The aim of the educational module is to give learners a comprehensive overview of the topic imaging procedures and to assist them in understating what Imaging Procedure and the course will cover common imaging methods used such as x-ray, CT, MRI, and ultrasound - as well as discuss emerging techniques, such as photoacoustic imaging. The basic principles, instrumentation, and applications of each imaging modality will be presented with interactive lectures and comprehensive quizzes from an enthusiastic and knowledgeable instructor. Learners will complete quizzes to apply their newly acquired skills and knowledge.

4.4.1 Imaging Procedures (IP-DT4-I)-Introduction

After the successful completion of this unit learners will (knowledge):

- Understand the evolution and principles of Imaging Procedures
- Overview of digital Imaging Procedures applications in different modalities.

will be able to (skills):

- Basic understanding of Imaging Procedures
- Familiarity with various applications of digital x-ray

and will (competences)

- be able to differentiate between the Imaging Procedures
- be able to knowledge how use Imaging Procedures

Content

- What is imaging procedures?
- Medical imaging
- Who uses medical imaging

Training Methods:
- Self-paced online training
- Asynchronous online training

- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**: 1 Hours

Total ECVET Points: 0.04

4.4.2 Imaging Procedures (IP-DT4-C)- Core

After the successful completion of this unit learners will (knowledge):

- Understand principles of X-rays.
- understand basic information of type of x-rays.
- understand the advantages and disadvantages of X-ray.

will be able to (skills):

- use of x-rays
- use of various digital detectors and understanding their benefits in clinical settings

and will (competences)

- be able to perform and interpret digital x-ray procedures.
- be able to understand advantages and disadvantages of X-ray and application of them.

Content
- What's an X-Ray?
- X-rays
- Types of X-rays
- Advantages and disadvantages of X-ray
-

Training Methods:
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 4 Hours

Total ECVET Points: 0.14

4.4.3 Imaging Procedures (IP-DT4-I)- Advanced

After the successful completion of this unit learners will (knowledge):

- Deep understanding of CT scan.

- Deep understanding the magnetic resonance imaging (MRI).

- Deep understanding the Digital Fluoroscopy and Digital Radiography.

- Understanding of main modalities of Ultrasound.
- Learn the advantages and disadvantage Imaging Procedures.

will be able to (skills):

- understand the basic principle of CT scan.
- use magnetic resonance imaging (MRI).
- use Digital Fluoroscopy and Digital Radiography

and will (competences)

- be able to apply CT scan in clinical practice.

- be able to apply MRI in clinical practice.

- be able to apply Digital Fluoroscopy and Digital Radiography clinical practice.

Content
- CT scan

- Magnetic resonance imaging (MRI)

- Digital Fluoroscopy

- Digital Radiography

- Ultrasound

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hours

Total ECVET Points: 0.2

4.5 Radiology (R-DT5)

In this educational module learners will be introduced to the underlying principles behind conventional radiography, computerized axial tomography (CT), magnetic resonance imaging (MRI), and ultrasound. The aim of the educational module is to give learners a comprehensive overview of topics introduction to conventional radiography, computerized tomography (CT), ultrasound, magnetic resonance imaging (MRI), etc. Learners will complete quizzes to apply their newly acquired skills and knowledge.

4.5.1 Radiology (R-DT5-I)-Introduction

After the successful completion of this unit learners will (knowledge):

- Understand the history and fundamental principles of radiology.
- Familiarize with the role and importance of radiology in healthcare, including common modalities.

will be able to (skills):

- Basic knowledge of radiological principles and modalities.
- provide of radiology's historical development and current applications.

and will (competences)

- be able to identify various radiological modalities and their applications in healthcare.
- be able to the significance of radiology in patient diagnosis and treatment.

Content
- Introduction to Radiology
- The Role and Importance of Radiology in Healthcare
- Common Modalities in Radiology
-

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 1 Hours

Total ECVET Points: 0.04

4.5.2 Radiology (R-DT5-C)-Core

After the successful completion of this unit learners will (knowledge):

- Comprehensive understanding of core concepts in conventional radiography, computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound.
- Knowledge of radiation safety and dose optimization, radiation biology, and risks.

will be able to (skills):

- Proficiency in various radiological techniques and understanding of their clinical applications.
- Skills in optimizing radiological procedures for patient safety and quality.

and will (competences)

- Ability to interpret and apply core radiological concepts in clinical settings.
- Competence in maintaining safety standards and implementing dose optimization strategies.

Content
- Conventional Radiography
- Computed Tomography
- Magnetic Resonance Imaging
- Radiology: Ultrasound
- Radiation Safety and Dose Optimization
- Radiation Biology and Risks
- Quality Assurance

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 4 Hours

Total ECVET Points: 0.14

4.5.3 Radiology (R-DT5-C)-Advanced

After the successful completion of this unit learners will (knowledge):

- Acquire in-depth understanding of advanced topics in radiology, including conventional radiography, CT, MRI, and ultrasound.

- Develop skills for advanced image interpretation and analysis.

will be able to (skills):

- Mastery of complex radiological techniques and their clinical applications.

- Advanced image analysis and interpretation skills.

and will (competences)

- Ability to perform and interpret advanced radiological procedures.

- Capacity to integrate radiological findings with clinical data for accurate diagnosis and management.

Content

- Conventional Radiography

- Computerized Tomography (CT)

- Magnetic Resonance Imaging (MRI)

- Ultrasound Modality

- Comparing Imaging Modalities

-

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 4 Hours

Total ECVET Points: 0.14

4.6 Digital X-Ray (DX-DT6)

In this educational module learners will be introduced to digital x-ray technology and practices. The aim of the educational module is to give learners a firm knowledge of X-ray technicians, to acquire the knowledge to perform in the general radiography and electrocardiograms and many more tests with the technology of electromagnetic radiations. Learners will complete quizzes to apply their newly acquired skills and knowledge.

4.6.1 Digital X-Ray (DX-DT6-I)-Introduction

After the successful completion of this unit learners will (knowledge):

- Understand the evolution and principles of digital radiographic imaging.
- Overview of digital x-ray applications in different modalities.

will be able to (skills):

- Basic understanding of digital x-ray technology and history.
- Familiarity with various applications of digital x-ray.

and will (competences)

- be able to differentiate between film-based and digital x-ray systems.
- be able to understand of the advantages of digital x-ray systems over traditional methods.

Content

- Review the development of digital radiographic imaging
- Overview of digital x-ray utilization in different modalities

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 1 Hours

Total ECVET Points: 0.04

4.6.2 Digital X-Ray (DX-DT6-C)-Core

After the successful completion of this unit learners will (knowledge):

- Understand principles of conventional and digital radiographic imaging.
- Gain knowledge in X-ray production, image acquisition techniques, and advantages of digital detectors.

will be able to (skills):

- Ability to differentiate and apply techniques in conventional radiography and digital radiography.
- Skill in using various digital detectors and understanding their benefits in clinical settings.

and will (competences)

- Competence in performing and interpreting digital x-ray procedures.
- Ability to integrate safety protocols and quality assurance in radiographic practices.

Content

– a review of the principles of conventional, computed radiography and digital radiography
– a review of the applications of digital radiography and fluoroscopy
– a review of the application of digital technology in mammography dental imaging, and computed tomography.

Training Methods:
– Self-paced online training

– Asynchronous online training

– Learner-centred content

– Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 4 Hours

Total ECVET Points: 0.14

4.6.3 Digital X-Ray (DX-DT6-A)-Advanced

After the successful completion of this unit learners will (knowledge):

- Deep understanding of advanced concepts in digital X-ray, including computed radiography and digital detectors.
- Deep understanding of clinical display quality control.

will be able to (skills):

- Expertise in advanced digital radiography techniques.

-   Proficiency in quality control and optimization of clinical displays.

and will (competences)

-   Ability to apply advanced digital X-ray techniques in clinical practice.
-   Competence in managing and executing quality control protocols for digital X-ray systems.

<u>Content</u>

-   Computed Radiography Phosphor excitation
-   Computed Radiography Digitizer
-   Computed Radiography Photostimulable phosphor properties
-   Digital Radiography Flat Panels
-   Photoconductors in Direct Flat Panels
-   Digital Radiography How Flat Panels Work
-   ComparisonFilm-Screen Vs CR/DR Systems

<u>Training Methods:</u>

-   Self-paced online training

-   Asynchronous online training

-   Learner-centred content

-   Personalization (self-study courses)

<u>Assessment Methods</u>: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

<u>Total Training Hours</u>**:** 6 Hours

<u>Total ECVET Points:</u> 0.23

4.7 Ultrasound Technology (US-DT7)

In this educational module learners will be introduced to the concepts of ultrasound technician, also referred to as a sonographer or diagnostic medical sonographer. The aim of the educational module is to give learners a firm knowledge of technology, health and patient care. The ultrasound procedures and help monitor patient health in hospitals and community clinics through this specialized program covering all the key aspects of ultrasound technology, as well as anatomy and patient care. It aims to teach key aspects of ultrasound technology, such as cardiac and vascular systems and abdomen and superficial structures. Learners will complete quizzes to apply their newly acquired skills and knowledge.

4.7.1 Ultrasound Technology (US-DT7-I)-Introduction

After the successful completion of this unit learners will (knowledge):

- Understand basic principles of ultrasound physics.
- Identify various applications of diagnostic ultrasound.
- Recognize different ultrasound imaging modes.
- Comprehend safety considerations and risks in ultrasound imaging.

will be able to (skills):

- Understanding of basic ultrasound physics and technology.
- Familiarity with various ultrasound imaging modes and their clinical relevance.

and will (competences)

- Ability to identify appropriate ultrasound applications in different medical scenarios.
- Awareness of safety standards and risks associated with ultrasound imaging.

Content

- General on Ultrasound Technology
- Applications
- Imaging Modes
- Risks

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content
- Personalization (self-study courses)

<u>Assessment Methods</u>: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

<u>Total Training Hours</u>**:** 4 Hours

<u>Total ECVET Points:</u> 0.14

4.7.2 Ultrasound Technology (US-DT7-C)-Core

After the successful completion of this unit learners will (knowledge):

- Master the principles of ultrasound imaging and image interpretation.
- Understand the effective operation of ultrasound equipment.
- Application of ultrasound technologies in various clinical scenarios like obstetric, abdominal, and cardiac imaging.
- Implement safety and quality assurance measures in ultrasound practice.

will be able to (skills):

- Proficiency in principles and techniques of ultrasound imaging.
- Deep understanding of the operation of ultrasound equipment.

and will (competences)

- Competence in the application of ultrasound technology to a range of clinical cases.
- Ability to implement and adhere to safety and quality standards in ultrasound practice.

<u>Content</u>

- Physics and Instrumentation of Ultrasound
- Summary
- Characteristics of ultrasound waves
- Operation of ultrasound equipment
- Principles of image formation and interpretation - Interactions of Ultrasound with tissue
- Instrumentation of medical ultrasound systems

- Transducer and its Types

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 4 Hours

Total ECVET Points: 0.14

4.7.3 Ultrasound Technology (US-DT7-A)-Advanced

After the successful completion of this unit learners will (knowledge):

- Understand specialized ultrasound applications (breast, prostate, musculoskeletal).
- Understand the implementation of advanced ultrasound techniques like Elastography and 3D/4D imaging.
- Conduct research and stay updated on emerging ultrasound technologies.
- Uphold advanced safety and quality assurance standards.

will be able to (skills):

- Expertise in the technology of specialized ultrasound applications (e.g., breast, prostate imaging).
- Proficiency in the technology of advanced ultrasound techniques (e.g., Elastography, 3D/4D imaging).

and will (competences)

- Ability to conduct research and critically evaluate emerging ultrasound technologies.
- Upholding advanced safety and quality assurance standards in ultrasound practice.

Content

- Clinical Applications of Ultrasound

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 4 Hours

Total ECVET Points: 0.14

4.8 Technical Principles of Radiological Mammography (RM-DT8)

<u>Description:</u>

In this educational module learners will be introduced to the concepts of Technical Principles of Radiological Mammography. In this educational module learners will be introduced to the concepts of such as Mammographic Positioning, breast imaging Techniques, Breast Cancer Treatments. Learners will complete quizzes to apply their newly acquired skills and knowledge.

4.8.1 Technical Principles of Radiological Mammography (RM-DT8-I)-Introduction

After the successful completion of this unit learners will (knowledge):

- Know the definition of radiological mammography.
- Know the components of the mammography equipment.

will be able to (skills):

- use the main Technical of Radiological Mammography
- Improved the skills of patient placement.

and will (competences)

- Able to understand the importance of correct image acquisition

<u>Content</u>

- Radiological Mammography
- The process
- Preparing for a correct exam
- Mammography equipment
- History
- Description of next learning units

<u>Training Methods:</u>

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 1 Hour

Total ECVET Points: 0.04

4.8.2 Technical Principles of Radiological Mammography (RM-DT8-C)-Core

After the successful completion of this unit learners will (knowledge):

- Know what means screening mammography.
- Know the importance of anatomical terms.
- Know what means correct CC and MLO view.
- Know the importance of correct positioning and compression.

will be able to (skills):

- use the main Technical of Radiological Mammograhy.
- Improving skills in getting a perfect CC and MLO view.

and will (competences)

- be able to apply correct position and compression in order to get a perfect CC and MLO view.

Content
- Screening mammography
- Important anatomical terms
- What means correct CC/MLO view
- Positioning and compression

- Getting a perfect CC/MLO view
• Importance of compression

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 4 Hours

Total ECVET Points: 0.14

4.8.3 Technical Principles of Radiological Mammography (RM-DT8-A)-Advanced

After the successful completion of this unit learners will (knowledge):

- Know the components of the X-ray tube.
- Know how an x-ray spectrum is composed.
- Know the importance of tube poor, tube filtration and beam quality on the creation of a correct x-ray picture.
- Know why the collimation of the beam and the use of the grid is mandatory to get a correct mammogram.
- Know the types of image receptors.

will be able to (skills):

- Improve skills in reducing geometric blurring.
- Improve skills on correct selection of tube potential, tube anode material and material for x-ray beam filtration.
- Improve skills in collimation alignment.
- Improve skills on image receptor settings.
- Improve skills on AEC settings

and will (competences)

- be able to get an optimum mammogram from a given radiological equipment.

Content
- X-ray tube
- X-ray spectrum (Beam Quality)
- Tube Port, Tube Filtration, and Beam Quality
- Beam Quality and Half-Value Layer
- Beam Collimation
- Grid
- Image Receptor
- Automatic Exposure Control (AEC)

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.23

4.9 Diagnostic Imaging (DI-DT9)

Description:

The aim of the educational module is to give learners the principles of diagnostic imaging. In this educational module learners will be introduced to the concepts of such as Introductions to conventional radiography, computerized tomography (CT), ultrasound, magnetic resonance imaging (MRI), chest radiology, CT of chest, chest radiology. Learners will complete quizzes to apply their newly acquired skills and knowledge.

4.9.1 Diagnostic Imaging (DI-DT9-I)-Introduction

After the successful completion of this unit learners will (knowledge):

- Know information related to diagnostic imaging from different imaging modalities.
- Know how to obtain a clinical diagnosis   as component of a medical test: image analyses.

will be able to (skills):

- provide accurate diagnostic based on: X-rays interpretation, nuclear medicine (CT, SPECT, MRI or PET), or non-ionizing radiation techniques.

and will (competences)

- Competences in making the diagnosis based on specific medical tests that involve image analysis.
- -Competences in X-rays tests interpretation, nuclear medicine tests interpretation (such as CT, SPECT, MRI or PET), or in case of non-ionizing radiation measurements.

Content

- History of Diagnostic Imaging
- Importance of Diagnostic Imaging

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 4 Hours

Total ECVET Points: 0.14

4.9.2 Diagnostic Imaging (DI-DT9-C)-Core

After the successful completion of this unit learners will (knowledge):

- Understand of benefits and disadvantages of a classic method in diagnostic imaging- radioscopy.
- learn on Computer axial tomography – investigation method.
- learn on Ultrasound (Echography) investigations.
- learn on Colour, power, and pulsed Doppler investigations.
- learn on Magnetic resonance investigations

will be able to (skills):

- in radioscopy and radiography investigations techniques
- new skills in Computer axial tomography techniques and applications
- in Ultrasound investigations and applications.
- in Colour, power and pulsed Doppler investigation method.
- in Magnetic resonance investigation methods.

and will (competences)

- Getting competences in choosing and evaluating of the most suitable investigation methods for correct diagnosis in various medical conditions.

Content

- Classic methods, radioscopy

- Radioscopy with image amplifier and television

- Radiography

- Radiography – variants

- Computer axial tomography

- Ultrasound (Echography)

- Color doppler

- Continuous doppler

- Magnetic resonance

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 4 Hours

Total ECVET Points: 0.14

4.9.3 Diagnostic Imaging (DI-DT9-A)-Advanced

After the successful completion of this unit learners will (knowledge):

- Know some introductive items on medical imaging of the human body, the X-Ray sagittal and coronal projections.
- Know introductive items on body structure directional terms and anatomical directions.
- Know introductive notions on body cavities.
- Know and identifying the 9 body regions.
- Know basic principles in nuclear medicine, comparison of modalities.

- Know introductive notions in medical imaging clinical applications (X-ray, ultrasound, nuclear, MR, CT)
- Know some developments in radioscopy and Radiology investigations methods.
- Know introductive notions in Ultrasound (Echography), and Doppler investigations methods.
- Know basis and introductive notions in magnetic resonance.

will be able to (skills):

- recognise the body planes of division.

- recognise the body structure, directional terms, and anatomical directions.

- identify the 9 body regions.

- on basic principles in nuclear medicine, comparison of modalities.

- on introductive notions in medical imaging (X-ray, ultrasound, nuclear, MR, CT)

- on introductive notions in Ultrasound (Echography), and Doppler investigations methods.

- in magnetic resonance investigation methods.

and will (competences)

- Competences in introductive notions on body cavities, body structure and anatomical directions.

- Competences in choosing and evaluating of the most suitable methods of investigation (X-ray, ultrasound, nuclear, MR, CT) for the correct diagnosis of patients

Content
- History, Basic Principles, & Modalities

- Directional Terms

- Planes of Division

- Anatomical Directions

- Body Regions

- Computerized Tomography (CT)

- Nuclear Medicine

- Classic methods, radioscopy

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

<u>Assessment Methods:</u> *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

<u>Total Training Hours</u>**:** 8 Hours

<u>Total ECVET Points:</u> 0.23

4.10 Semiconductor Lasers (SL-DT10)

<u>Description:</u>
In this educational module learners will be introduced to the concepts of Semiconductor Lasers. The aim of the educational module is to give semiconductor light emitting diodes (LEDs) and lasers, and the important rules for their analysis, planning, design, and implementation. Also, it aims to assist design a semiconductor light emitting diode and analyse efficiency and to choose suitable semiconductor materials for light emitting devices. Learners will complete quizzes to apply their newly acquired skills and knowledge.

4.10.1 Semiconductor Lasers (SL-DT10-I)-Introduction

After the successful completion of this unit learners will (knowledge):

- Learn on Radiations spectrum.
- Learn on Laser beam properties.
- Understand of Classification of lasers in four main classes upon determined risk.
- Learn on most frequent used semiconductor lasers.

will be able to (skills):

- knowledge about laser beam properties: the reflection, transmission, spread and absorption.
- Identify of the four main classes of lasers upon the dermatological risk

- Identify of the type of lasers depending on their medical applications (and emission power)

and will (competences)

- be able to how to choose and use lasers to avoid any dermatological risk or serious risks of burns.
- be able to how to choose lasers powers depending on their medical applications and function of their wavelength {which influences absorption in water and haemoglobin).

Content

- Radiations spectrum
- Laser beam properties
- Classification of lasers
- LLLT semiconductor lasers

Training Methods:
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 1 Hour

Total ECVET Points: 0.03

4.10.2 Semiconductor Lasers (SL-DT10-C)-Core

After the successful completion of this unit learners will (knowledge):

- Know the most important parameters in biostimulation
- Know the safety rules in LLLT.
- Know the Biological effects in LLLT.
- Know the vascular and analgesic effects in LLLT.

- Know the mechanism therapy in LLLT .
- Know the Side effects and complications in LLLT
- Contraindications in LLLT.
- Know how to calculate the radiation dose.
- Know the treatment points for different treatments type.
- Know the absorption in chromophores mechanism.
- Know the applications of low intensity lasers LIL and high intensity lasers HIL.

will be able to (skills):

- about the main semiconductor lasers, their benefits and disadvantages.

- on parameters in bio stimulation of different types of lasers.

- on Safety rules in LLLT

- on different treatment methods based on LLLT

- on different LLT application based on their properties such as: cell division, vascular and analgesic effects.

- on how to avoid side effects and different complications in LLLT

- of radiation dose calculation.

and will (competences)

- relate to LLLT treatment points techniques, penetration depth and applications related to tissue penetration necessities and therapeutic effects envisaged.
- relate to calculation of one of the most important parameters in LLLT: the radiation dose.
- relate to the most important parameters in biostimulation of different main type of lasers in LLLT.

<u>Content</u>
- GaAs laser
- InGaAlP laser
- Important parameters in biostimulation
- Safety rules in LLLT
- Biological effects in LLLT
- Actions of LLLT
- Side effects and complications in LLLT
- LLLT techniques
- comparison lil – hil

<u>Training Methods:</u>

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**: 4 Hours

Total ECVET Points: 0.12

4.10.3 Semiconductor Lasers (SL-DT10-A)-Advanced

After the successful completion of this unit learners will (knowledge):

- Know of treatment points used in LLLT techniques.

- Know of Myofascial trigger points in LLLT techniques

- Know of the three techniques in location of points for LLLT: palpation, measurement of painful pressure threshold (PPT), measuring of the electrical resistance.

- Know of LLLT principles related to the location of the treatment points.

- Know of the specific LLLT treatment techniques in points.

- Know how to use of "laser shower" type probes -examples and applications.

- Know of the Treatment guide in LLT

- LTT methodology

will be able to (skills):

- find the points of local sensitivity used n LLLT techniques.

- find the myofascial trigger points used n LLLT techniques.

- find the acupuncture points used n LLLT techniques.

- find the location of points for LLLT through palpation, measurement of painful pressure threshold and through measuring of electrical resistance

- apply the LLLT principles the find the exact location of the treatment points, for adjusting of laser radiation at the treatment points and to combine different groups of points for LLLT.

- apply "laser shower" treatments method.

- use LLLT in traumatology such as fractures or articular trauma.

and will (competences)

- in finding the points of local sensitivity used n LLLT techniques
- in finding the acupuncture points used n LLLT techniques
- in finding the exact location of points used in LLLT treatment
- in applying of "laser shower" treatments method.
- in using LLLT treatment methods in traumatology.

Content

- Calculation of the radiation dose
- LLLT technique
- Treatment points
- Points of local sensitivity (AHSHI)
- Miofascial trigger points (TP)
- Palpation
- Measurement of pressure pain threshold (PPT) and pain tolerance (PTO)
- LLLT methodology

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 8 Hours

Total ECVET Points: 0.2

5. Health Data Science (HDS)

Health Data Science Course consists of the following ten modules:

- <u>Introduction to Health Data Science (I-HDS1)</u>
- <u>Health Informatics (HI-HDS2)</u>
- <u>Database Management (DM-HDS3)</u>
- <u>Digital Big Data Analysis (BD-HDS4)</u>
- <u>Machine Learning (ML-HDS5)</u>
- <u>Deep Learning (DL-HDS6)</u>
- <u>Neural Networks (NN-HDS7)</u>
- <u>Artificial Intelligence (AI-HDS8)</u>
- <u>Data Analytics and Visualization (DAV-HDS9)</u>
- <u>Statistics (S-HDS10)</u>

In figure 4, present the Health Data Science Module and training units.
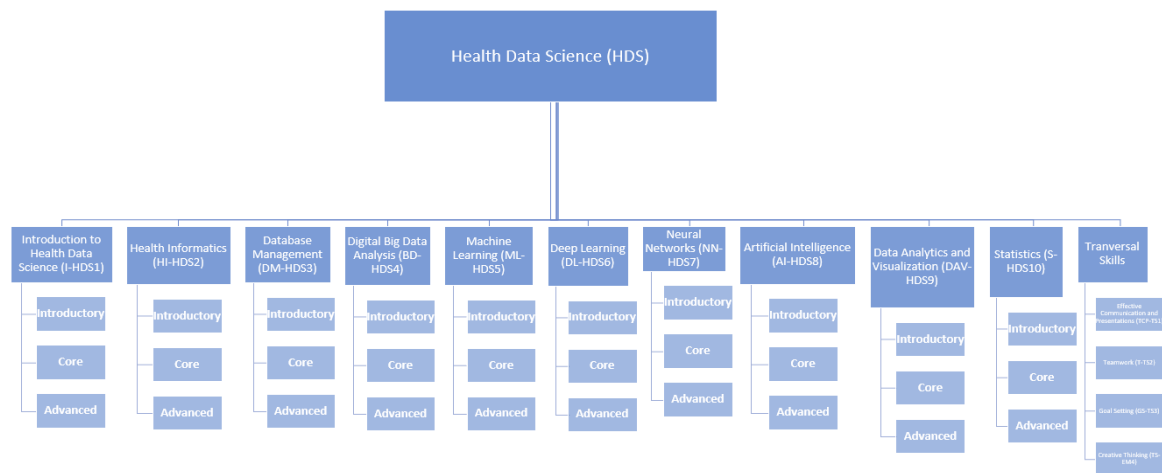
Figure 4 Health Data Science (HDS) M and training units

5.1 Introduction to Health Data Science (I-HDS1)

Description:

This educational module consists of an introduction to the health data science technology concept and its applications. It aims to make the learners familiar with the health data science technology and cover topics such as how data science is used to address healthcare problems, issues surrounding access to health data, tools and techniques in health data science, databases, and data extraction etc. Learners will complete quizzes to apply their newly acquired skills and knowledge.

5.1.1 Introduction to Health Data Science (I-HDS1-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know the definition of Health Data Science.
- Understand the importance of Health Data Science.
- Have a knowledge of the seven applications of Health Data Science.

will be able to (skills):

- Identify the most important applications in healthcare industry, including those related to patient care, operations, and medicines.
- use of Data science tools leads to able to identify and monitor widespread disorders to patients.

and will (competences)

- Research on Health Data Science to anticipate potential diseases and spot even the smallest changes in the patient's health markers.
- To make educated judgments on the health conditions of their patients, everyone from physicians to health insurance companies.

Content:

- Introduction of Health Data Science
- Definition of Health Data Science
- Application and Use Cases of Data Science in Healthcare

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 1 Hour

Total ECVET Points: 0.045

5.1.2 Introduction to Health Data Science (I-HDS1-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Understand the function of data science in healthcare.
- Get the necessary abilities to provide an accurate diagnosis.
- Have an overview on the new medical technologies.
- Understand Data Interoperability main issues and constraints.

will be able to (skills):

- to make precise forecasts and prescriptions
- Increase the ability to access to health data, giving healthcare practitioners a comprehensive perspective of patient health.

and will (competences)

- Apply the knowledges offered by Health Data Science assist the clinical decisions clinicians make every day.

- assist clinicians in lowering inefficiencies and personalizing medicine for patients.
- facilitate the use of available data of medical devices for shared decision making with patients.

Content:

- Role of a Data Scientist in Healthcare
- Benefits Of Data Science in Healthcare
- Data Science Healthcare Projects
- Top 10 New Medical Technologies

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 4 Hours

Total ECVET Points: 0.18

5.1.3 Introduction to Health Data Science (I-HDS1-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know of the advantage of EMPI data base.
- Knowledge on OIDs scheme for unique identifiers.
- Know the Interoperability Standards Guidelines for Disease Surveillance.
- Knowledge related to the European Health Data Space - Knowing the steps to be considered in the data quality life cycle.
- Knowledge on the investment in ICT infrastructure related to digital health.

will be able to (skills):

- Analyse of the possibilities in choosing of an appropriate interoperability standard apt to promote the collection of good quality data.
- Analyse of the best practices for cross border health data exchange - digital processes of the workspace, region, country.

and will (competences)

- Educate health care personnel on how to exploit the potential of exchanging health data to ensure health data quality.
- Competences related to technical and semantic interoperability between the different infrastructures and IT systems.
- Models in transfer data process to workspace

Content:
- Top 10 Technologies to Learn:
  - Data Science
  - Cloud Computing
  - DevOps
  - UI/UX
  - Artificial Intelligence
  - Cybersecurity
  - Full Stack Web Development
  - Salesforce
  - Product Management

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hours

Total ECVET Points: 0.27

5.2 Health Informatics (HI-HDS2)

Description:

In this educational module learners will be introduced to health informatics, the field devoted to the optimal use of data, information, and knowledge to advance individual health, health care, public health, and health-related research. The learners will learn the application of informatics skills and knowledge to health-related problems. Application activities will include such as simple data analysis and visualization of clinical data, answering clinical questions using information retrieval methods, and doing simple association analysis of gene variants and disease. Learners will complete quizzes to apply their newly acquired skills and knowledge.

5.2.1 Health Informatics (HI-HDS2-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know the definition of Health Informatics.
- Understand the importance of health informatics and its main areas.
- health informatics in connection with the advanced technology and standards improvements.

will be able to (skills):

- Identify the main domain of health informatics:

- Clinical informatics

- Clinical research informatics

- Consumer health informatics

- Public health informatics

- Translational bioinformatics

and will (competences)

- able to implement the five steps belonging to Health Informatics.
- able to research on clinical informatics, consumer health informatics.

Content:

- What is Health Informatics
- The main areas of Health Informatics
- The future of health informatics

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 1 Hour

Total ECVET Points: 0.04

5.2.2 Health Informatics (HI-HDS2-C)-Core

<u>Learning outcomes</u>

After the successful completion of this unit learners will (knowledge):

- Know of dataflow related to public health surveillance.
- Know of Communicable diseases data flow for integrated digital surveillance systems
- learn on the benefits of interoperability in healthcare.
- learn on The European Interoperability Framework conceptual model.
- learn the reEIF interoperability levels.

will be able to (skills):

- Follow the dataflow organigramme related to public health surveillance.

- Improve quality of care and patient experience by applying interoperability in healthcare.

- Identify of the six interoperability levels of refined eHealth European Interoperability Framework (reEIF).

and will (competences)

- be able to modernize traditional health surveillance systems by exploiting developments in digital technologies to significantly.
- be able to react in case of unexpected outcomes due to medical devices error.
- be use available data of medical devices for shared decision making with patients.

<u>Content:</u>

- Integrated Digital Surveillance Systems.
- High level surveillance data flow.
- Integrated Digital Surveillance Systems.
- Why Interoperability is crucial in healthcare.
- The benefits of interoperability in healthcare.
- The European Interoperability Framework conceptual model.
- The Refined eHealth European Interoperability Framework (reEIF).

<u>Training Methods:</u>

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 4 Hour

Total ECVET Points: 0.14

5.2.3 Health Informatics (HI-HDS2-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know the four levels of information technology interoperability related to healthcare data exchange.
- Know the Standards for health information exchange.
- Know the International Classification of Diseases (ICD) – a medical coding system.
- Know the content and format of standards regard the medical data content exchange.

will be able to (skills):

- use Digital Imaging and Communications in Medicine such as DICOM and other health information exchange standards for transmission of health-related data.
- understand and to apply the Interoperability Standards Guidelines for Disease Surveillance.

and will (competences)

- be able to operate across all EU countries and process EU citizens' data wherever they are in the European block without having to worry about diverging national legislations.
- be able to provide relevant information to support the health professionals to select standards and profiles for interoperability, as well as a health data entity for each Member State

Content:

- Applicable standards and technologies for health information exchange
- Standards for health information exchange
- ICD-10
- ICD-11
- LOINC
- SNOMED-CT
- Identification of Medicinal Products (IDMP)
- HL7 CDA profile - Consolidated CDA (HL7 C-CDA)
- International Patient Summary (IPS)
- Transport standards
- Integrating the Healthcare Enterprise (IHE)
- Digital Imaging and Communications in Medicine (DICOM)
- General Data Protection Regulation (GDPR)

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 6 Hours

Total ECVET Points: 0.2

5.3 Database Management (DM-HDS3)

Description:

In this educational module, is an introduction to the use of relational databases and data visualization tools for decision-making. The aim of the educational module is to give learners the how to apply design and implementation of, and data retrieval from, small-to-medium relational database systems and it covers topics such as data manipulation, analysis and visualization. Learners will complete quizzes to apply their newly acquired skills and knowledge.

5.3.1 Database Management (DM-HDS3-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know about the PostgreSQL fundamentals, from installation to user and data management.
- Know advanced database topics such as indexes, optimization, and partitioning.
- Know Specialized features including full-text search and JSON data handling.

will be able to (skills):

- Proficient in PostgreSQL database installation and configuration.
- Strong expertise in creating and managing relational databases.
- Skilled in defining data types and enforcing constraints in PostgreSQL.
- Proficient in designing and optimizing database tables and queries.
- Experienced in implementing advanced database features like partitioning and indexing.
- Competent in leveraging PostgreSQL for full-text search and handling JSON data.

and will (competences)

- Demonstrated competence in database administration and PostgreSQL management.
- Proven ability to design and implement efficient database structures and queries in PostgreSQL.
- Adept at leveraging advanced PostgreSQL features for enhanced data management and performance.

Content:
- What is a Database?
- Relational and Object Relational Database Management Systems
- Data Models
- Importance of Databases in Healthcare
- Databases for Medicine and Healthcare

Training Methods:
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 2 Hour

Total ECVET Points: 0.07

5.3.2 Database Management (DM-HDS3-I)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Understand of PostgreSQL's architecture and role in modern database management.
- Proficiency in installing and configuring PostgreSQL server environments.
- Ability to create and manage databases, users, and roles within PostgreSQL.
- Familiarity with PostgreSQL's extensive data types and their practical applications.
- Knowledge of defining constraints and checks to ensure data integrity in PostgreSQL databases.
- Skill in designing and executing table creation processes in PostgreSQL.
- Mastery of both classical and persistent views for data presentation and manipulation in PostgreSQL.

will be able to (skills):

- Competent in efficiently installing and configuring PostgreSQL servers, ensuring optimal performance and security.
- Proficient in creating and managing databases, users, and roles in PostgreSQL, facilitating controlled data access.
- Skilled in utilizing a variety of data types within PostgreSQL to accommodate diverse data structures.
- Capable of implementing constraints and checks to enforce data integrity and reliability in PostgreSQL databases.

- Proficiency in designing and creating tables, as well as leveraging classical and persistent views for effective data management and presentation in PostgreSQL.

and will (competences)

- ▪ Possess a high level of competence in PostgreSQL database administration, ensuring seamless and reliable data management.
- ▪ Demonstrate competence in optimizing PostgreSQL installations, achieving peak performance and security.
- ▪ Show case a deep understanding of PostgreSQL's diverse data types and their strategic application in real-world scenarios.
- ▪ Exhibit competence in designing and implementing constraints and checks to maintain data consistency and quality within PostgreSQL databases.
- ▪ Display a strong competence in crafting efficient database structures, including table creation, and utilizing classical and persistent views for data manipulation and analysis in PostgreSQL environments.

Content:
- What is PostgreSQL.
- Installation server PostgreSQL.
- Create a database.
- Create users and roles.
- Data types.
- Constraints/Checks.
- Table Creation.
- Classical and Persistent views.

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hour

Total ECVET Points: 0.23

5.3.3 Database Management (DM-HDS3-I)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Profound knowledge of classical and conditional indexing techniques, optimizing query performance in PostgreSQL databases.
- In-depth understanding of GIN and GIST indexing methods, enabling efficient data retrieval and storage optimization in PostgreSQL.
- Expertise in optimization strategies for PostgreSQL databases, including query optimization and database tuning.
- Advanced knowledge of complex database operations, such as joins, subqueries, inheritance, partitioning, disk volume management, full-text search, and JSON data handling, facilitating robust data management and retrieval in PostgreSQL environments.

will be able to (skills):

- implement advanced indexing techniques like GIN and GIST to enhance data retrieval and storage efficiency in PostgreSQL.

- Proficient in optimizing PostgreSQL databases for high performance, employing strategies such as query optimization and resource management.

and will (competences)

- Demonstrated competence in effectively leveraging advanced PostgreSQL features like indexing, optimization, and complex data operations for efficient data management.

- Competent in designing and maintaining PostgreSQL databases with a focus on performance, scalability, and data integrity.

Content:
- Classical and conditional indexes
- GIN / GIST indexes
- Optimization
- Query with join, subqueries
- Inheritance
- Partitioning
- Disk volumes
- Full text search
- JSON data

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 10 Hours

Total ECVET Points: 0.23

5.4 Digital Big Data Analysis (BD-HDS4)

Description:

In this educational module, learners will be introduced principles of Big Data analysis and will be introduce the characteristics and related analytic challenges on dealing with clinical data. The aim of the educational module is to give learners the how to apply algorithms and systems in the context of healthcare applications. Learners will complete quizzes to apply their newly acquired skills and knowledge.

5.4.1 Digital Big Data Analysis (BD-HDS4-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Understand of the concept of Big Data, encompassing the challenges and opportunities posed by large and complex datasets.
- Familiarity with the 5 Vs of Big Data - Volume, Velocity, Variety, Veracity, and Value - and their significance in analyzing and processing data at scale.
- Knowledge of the historical evolution of Big Data, tracing its origins and the technological advancements that have driven its growth, as well as awareness of the diverse applications across industries, highlighting its transformative impact on decision-making and innovation.

will be able to (skills):

- Proficient in handling and managing large-scale datasets, including data collection, storage, and retrieval, to effectively work with Big Data.
- Skilled in utilizing Big Data tools and technologies, such as Hadoop, Spark, and NoSQL databases, for processing and analyzing massive datasets.
- Competent in implementing data quality and governance practices to ensure the accuracy and reliability of Big Data analytics.
- Experienced in designing and developing data pipelines for ingesting and transforming diverse data sources, catering to the varied 'Vs' of Big Data.
- Capable of employing advanced analytics techniques, including machine learning and data mining, to extract valuable insights and patterns from Big Data.

- Proficiency in applying Big Data solutions to real-world applications across industries, such as healthcare, finance, and e-commerce, to drive data-driven decision-making and innovation.

and will (competences)

- Demonstrated competence in harnessing Big Data technologies and methodologies to solve complex analytical challenges.
- Proven competence in designing and executing data strategies that leverage the full potential of Big Data for informed decision-making and strategic insights.

Content:
- What is Big data
- The 5 Vs of Big data
- History of Big data
- Applications of Big data

Training Methods:
- Self-paced online training.
- Asynchronous online training.
- Learner-centred content.
- Personalization (self-study courses).

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 2 Hours

Total ECVET Points: 0.07

5.4.2 Digital Big Data Analysis (BD-HDS4-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Understanding of the diverse applications of Big Data in everyday life, from personalized recommendations in e-commerce to predictive healthcare analytics.
- Familiarity with best practices in managing and analysing Big Data, including data quality assurance, security measures, and scalability considerations.
- Knowledge of the pivotal role of Big Data in today's world, highlighting its impact on informed decision-making, business innovation, and societal advancements.
- Insight into the architecture of Big Data systems, encompassing data storage, processing frameworks, and distributed computing technologies like Hadoop and Spark.
- Awareness of the different types of Big Data, such as structured, semi-structured, and unstructured data, and their relevance in various applications.
- Understanding of the significance of Big Data in the healthcare sector, including the challenges and opportunities posed by medical Big Data, and the steps involved in its analysis for improved patient care and medical research.

will be able to (skills):

- Proficient in implementing effective data collection and processing strategies, ensuring the utilization of Big Data for actionable insights.
- Skilled in adhering to Big Data best practices, including data governance, quality assurance, and scalability, to maintain data integrity and optimize analytics.
- Competent in utilizing Big Data tools and platforms to design and execute complex data analysis workflows, enabling data-driven decision-making in diverse domains.

and will (competences)

- Demonstrate competence in successfully applying Big Data solutions across a range of practical scenarios, showcasing the ability to extract valuable insights and drive informed decision-making.
- Proven competence in architecting and managing Big Data systems, encompassing data storage, processing, and analytics, to meet specific business and industry requirements.
- Establish competence in the comprehensive analysis of Big Data, including data preprocessing, modeling, and interpretation, contributing to actionable results and strategic recommendations.

Content:
- Applications of Big data in Everyday Life

- Big Data Best Practices

- Why Big Data is Important

- Architecture of Big Data

- Types of Big Data
- Medical Big Data
- Steps of Analysis of Big Data

Training Methods:
- Self-paced online training.
- Asynchronous online training.
- Learner-centred content.
- Personalization (self-study courses).

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 5 Hours

Total ECVET Points: 0.17

5.4.3 Digital Big Data Analysis (BD-HDS4-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Understanding of how files are stored in Hadoop's distributed file system, including the principles of data distribution and replication for fault tolerance.
- Familiarity with practical examples of Hadoop fs commands for file manipulation and interaction within Hadoop's distributed file system.
- Knowledge of the MapReduce workflow, encompassing the key phases of data processing: Map, Shuffle and Sort, and Reduce.
- Insight into the components of the Hadoop ecosystem, particularly the MapReduce framework, and their roles in processing and analyzing large datasets.
- Awareness of the driver code in MapReduce, which orchestrates the execution of Mapper and Reducer tasks, and how it controls the data flow in a MapReduce job.
- Proficiency in writing Mapper and Reducer code to define the data processing logic for specific tasks, and the ability to set up and configure Hadoop

environments, including Hadoop files and directories, for efficient data processing.

will be able to (skills):

- Use Hadoop fs commands and techniques for managing files in Hadoop Distributed File System (HDFS).

- Develop MapReduce applications, including writing driver, mapper, and reducer code, and configuring Hadoop environments for efficient data processing.

and will (competences)

- Be able to demonstrate competence in effectively utilizing Hadoop's MapReduce framework to process and analyze large-scale datasets, translating complex data into valuable insights.
- Proven competence in managing Hadoop file systems and configuring MapReduce jobs, showcasing the ability to architect and execute distributed data processing workflows for diverse applications.

Content:
- How Files are Stored
- Hadoop fs Examples
- The MapReduce Flow
- Hadoop Components: MapReduce
- Example: WordCount Mapper
- Example: Shuffle & Sort
- MapReduce: The Mapper
- Hadoop Files
- WordCount Test

Training Methods:
- Self-paced online training.

- Asynchronous online training.

- Learner-centred content.

- Personalization (self-study courses).

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

5.5 Machine Learning (ML-HDS5)

Description:

In this educational module, learners will be introduced the fundamental concepts and principles of machine learning as it applies to medicine and healthcare. The aim of the educational module is to get the explore machine learning approaches, medical use cases, metrics unique to healthcare, as well as best practices for designing, building, and evaluating machine learning applications in health.

5.5.1 Machine Learning (ML-HDS5-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- understand basic information machine learning.
- understand the history and definition of machine learning.
- understand the Concept of Machine Learning.
- understand basic information of Classification Metrics
- understand applications of machine learning in health sciences.

will be able to (skills):

- explain the key concepts of Machine Learning
- understand the aim of Machine Learning methods.

and will (competences)

- be able to recognize problems that Machine Learning methods can be applied.
- be able to understand what.
- be able to apply the basic operation principles of Machine Learning main techniques, and to know how to use on the environment.

Content:

• History of Machine Learning.

- What is machine learning.

- Why and when to use machine learning.

- Machine learning algorithms.

- Performance and metrics.

- Applications of machine learning in health sciences.

<u>Training Methods:</u>
- Self-paced online training.

- Asynchronous online training.

- Learner-centred content.

- Personalization (self-study courses).

<u>Assessment Methods</u>: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

<u>Total Training Hours</u>**:** 2 Hours

<u>Total ECVET Points:</u> 0.07

5.5.2 Machine Learning (ML-HDS5-C)-Core

<u>Learning outcomes</u>

After the successful completion of this unit learners will (knowledge):

- understand the most common machine learning techniques for unsupervised and supervised tasks.
- understand the principal models used in machine learning and the types of problems to which they are typically applied.
- understand basic information of Classification Metrics Pooling layers.

- understand how to build a machine learning model and how to to solve health problems

will be able to (skills):

- Skilled in several analytical tools for maintaining and analysing data, and to apply them to real-world problems in an independent and critical way.
- Skilled in the basic principle of the machine learning
- Skilled in the most common machine learning techniques for unsupervised and supervised tasks.
- Skilled in build machine learning model and solve health problems (cases)

and will (competences)

- solve a problem using machine learning techniques.
- recognize different types of unsupervised learning problems, and select and apply appropriate.
- compare different paradigms for learning (supervised, unsupervised, etc...).

Content:
- The power of Machine Learning.

- Pattern recognition and classification.

- Clustering.

- Supervised & unsupervised learning.

- Algorithms (supervised).

- Algorithms (unsupervised).

- Performance and metrics.

- Building a ML model.

- Building a ML model to solve health problems (cases).

Training Methods:
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 5 Hours

Total ECVET Points: 0.17

5.5.3 Machine Learning (ML-HDS5-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge)

- understand the machine learning frameworks.
- understand how to install and use WEKA framework.
- understand how to install and use Scikit-Learn.
- understand how to install and use TensorFlow.
- understand machine learning frameworks.
- understand the role of machine learning in medicine.

will be able to (skills):

- use machine learning frameworks for health problems.
- apply machine learning to health problem and interpret the results.
- use WEKA for medical dataset.
- use Scikit-Learn for medical dataset.
- use TensorFlow for medical dataset.
- gain problem solving skills.
- how to communicate complex information to those without expertise.

and will (competences):

- Able to work through a dataset end-to-end and deliver a set of predictions or a high-performance model.
- Able to know your way around the Weka machine learning workbench including how to explore algorithms and design-controlled experiments.
- Able to apply WEKA.
- Able to identify suitable Machine Learning approaches for real-world applications.
- Able to critically assess the potential impact and pitfalls of Machine Learning tools.

Content:

- What are Machine Learning Frameworks?
- WEKA
- Rapidminer
- Scikit-Learn
- TensorFlow
- Framework ML
- Roles of ML in Medicine

- Tools and Applications of Machine Learning in Medicine

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 8 Hours

Total ECVET Points: 0.27

5.6 Deep Learning (DL-HDS6)

Description:

In this educational module, learners will be introduced to the concepts of deep learning (DL) methods, healthcare data and applications using DL methods. The aim of the educational module is to get different DL and health applications topics. Learners will complete quizzes to apply their newly acquired skills and knowledge.

5.6.1 Deep Learning (DL-HDS6-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- understand basic information machine learning.
- understand basic information of neural network.
- understand basic information of Classification Metrics
- Know the basic concepts and terminology of neural networks and deep learning.
- Understanding of main modalities and applications of deep Learning in Health Science

will be able to (skills):

- explain the key concepts of Deep Learning
- understand the aim of Deep Learning methods.
- implement techniques machine learning and deep learning.

and will (competences)

- apply training deep learning models and the various "tricks" commonly used to get good model performance.
- how deep learning models are related to standard machine learning models.

Content:

- What is machine learning?
- What is neural network?
- Artificial intelligence, machine learning, deep learning
- Layers, hidden layers, and outputs.
- Why and when to use Deep learning.
- Classification Metrics.
- Applications of deep Learning in Health Science.

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 2 Hours

Total ECVET Points: 0.07

5.6.2 Deep Learning (DL-HDS6-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know and understand the details of CNNs including their architectural details and training.
- Be aware of the different CNN architectures used in literature.
- describe how and which real-world problems are best modelled using CNNs.
- understand basic information of Classification Metrics Pooling layers.

will be able to (skills):

- understand how deep learning methods operate identify the different
- deep learning techniques and their duties
- understand the different toolkits used by Deep Learning
- learn several analytical tools for maintaining and analyzing data, and to apply them to real-world problems in an independent and critical way.
- understand the basic principle of the deep learning.
- use CNNs in real-world problems.

and will (competences)

- be able to analyse deep learning and classification metrics.
- Be able to specify the details of CNNs including their architectural details and training and application of them in health.
- be able to apply deep learning meaning methods and solve problems

Content:
- What is a neural network?
- What is deep learning?
- Types of deep learning.
- Convolutional Neural Networks (CNNs).
- Long Short Term Memory Networks (LSTMs).
- Recurrent Neural Networks (RNNs).
- Self Organizing Maps (SOMs).
- Performance and Metrics.
- Encoding categorical data.

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 5 Hours

Total ECVET Points: 0.17

5.6.3 Deep Learning (DL-HDS6-A)-Advanced

<u>Learning outcomes</u>

After the successful completion of this unit learners will (knowledge):

- Enhance technical capabilities to solve real-world problems using AI technologies.
- Learn how to use Deeping Learning in Health such as medical image analysis.
- Ability to use python and DL frameworks (tensorflow, keras, pythorch etc.)
- Learn how to use PyTorch for building and testing deep learning models.
- Ability to analyse and improve deep learning models.
- Learn the advantages and disadvantage of Deep Learning.

will be able to (skills):

- evaluate, compare deep learning algorithms.
- apply deep learning to health problem and interpret the results.
- use DL frameworks for health problems.
- use PyTorch for medical image analysis.

and will (competences)

- Able to manipulate, analyses the health information in patient's.
- Able to build, train and apply fully connected deep neural networks.
- Able to use TensorFlow/PyTorch for health.
- Evaluation of deep learning systems
- Deep Learning use cases

  <u>Content:</u>
- Deeping Learning in Health

- Medical image analysis

- What is PyTorch?

- Introduction PyTorch

- Using PyTorch

- Advantages and Disadvantage Deep Learning

- Medical MNIST Dataset

<u>Training Methods:</u>

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

<u>Assessment Methods</u>: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

<u>Total Training Hours</u>**:** 8 Hours

<u>Total ECVET Points:</u> 0.27

5.7 Neural Networks (NN-HDS7)

Description:

In this educational module, learners will be introduced the Neural Networks and they will learn how to train very accurate convolutional neural networks to predict test images for binary class. The aim of the educational module is to learn how to use CV2 when predicting an image after training the convolutional neural network and also learn how to train a multi class Convolutional Neural Network and to use a Keras Load Model Function for both binary and multi class predictions.

5.7.1 Neural Networks (NN-HDS7-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know basic information of neural networks.
- know biological neuron and physical neural networks.
- know basic information of Artificial neuron.
- Know supervised and unsupervised learning in neural networks.

will be able to (skills):

- explain the key concepts of neural networks.
- understand the aim of neural networks.
- understand what neural networks can do.
- able to understand and to know how to use a neural network.

and will (competences)

- be able to recognize problems that neural networks can be applied.
- be able to understand what.
- be able by the issues involved in training neural networks.
- be able to relate to supervised and unsupervised learning.

Content:

- What is neural network?
- Biological neuron and physical neural networks
- Artificial neuron
- Artificial neural networks

- Artificial neural networks (Information Flow)
- Training and prediction
- Applications of neural networks in Health Science

Training Methods:
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**: 1 Hour

Total ECVET Points: 0.04

5.7.2 Neural Networks (NN-HDS7-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Describe the differences between a computer and a Neural Network
- understand the various learning methods and Neural Network architectures.
- understand the basic operation of the neurons in the brain.
- Describe the basic elements of the artificial neural networks (ANNs).
- understand ANNs' strengths and Weaknesses.
- understand the types of Artificial Neural Networks.

will be able to (skills):

- apply in the basic principle of the ANNs.
- use ANNs for diagnosis in medicine.
- understand and use the types of ANNs such as Feedforward Neural Network.
- Skilled in Feedforward Neural Network for diagnosis.
- understand how machine learning methods operate.
- identify the different Neural Networks roles.

- understand the different toolkits used by Neural Networks.

and will (competences)

- be able to analyse problems and face them with neural networks.
- be able to specify appropriate neural networks for given problems.
- be able to apply neural networks and solve problems.
- be able to solve practical health problem with artificial neural networks.

Content:

- Introduction ANNs
- Training methods
- Types of Artificial Neural Networks
- What is Feedforward Neural Network?
- Components of Feedforward Neural Networks
- Applications of Feedforward Neural Networks
- Diagnosis of Skin Lesions Using Feedforward Back Propagation Neural Networks
- Advantages of Feedforward Neural Networks
- What is radial basis function neural networks?

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 5 Hours

Total ECVET Points: 0.17

5.7.3 Neural Networks (NN-HDS7-I)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- understand the basic concepts associated with the various network structures / models including Convolutional Neural Networks (CNN), Recurring Neural Networks (RNN), Modular Neural Network
- Design and computer the parameters of a Kohonen Self-Organising Map neural network.
- understand the Neural Network Software
- Learn how to use CNN in Health such as medical image analysis.
- understand the Neural Network Software
- Ability to use python and DL frameworks (tensorflow, keras, pythorch) etc.
- Learn the advantages and disadvantage of neural networks.

will be able to (skills):

- understand CNN Neural Network

- apply neural networks to health problem and interpret the results

- use neural networks for health problems.

- use neural networks for medical image analysis

and will (competences)

- be able to design and develop neural networks to solve real world problem
- be able to build, train and apply fully connected neural networks.
- be able to Develop neural networks systems using TensorFlow/PyTorch for health.
- be able to use modern software for building and training deep convolutional neural networks to solve specific tasks.
- how neural networks fit into the more general framework of machine learning, and what their limitations and advantages are in this context.

Content:

- What is Self-Organizing Neural Network (SOM)- Kohonen?
- Recurrent Neural Network (RNN)
- Long Short-Term Memory
- Convolutional Neural Network
- Modular Neural Network
- Neural Network Software
- Neural Networks in Healthcare

Training Methods:
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

5.8 Artificial Intelligence (AI-HDS8)

<u>Description:</u>

In this educational module, learners will be introduced to artificial intelligence and Identify problems healthcare providers face that AI can solve it. The aim of the educational module is to get the learners relate AI to the science, practice, and business of medicine and to apply the building blocks of AI to help innovate and understand emerging technologies. Learners will complete quizzes to apply their newly acquired skills and knowledge.

5.8.1 Artificial Intelligence (AI-HDS8-I)-Introduction

<u>Learning outcomes</u>

After the successful completion of this unit learners will (knowledge):

- Know the fundamental principles of artificial intelligence and
- Know the foundation of AI and history of AI.
- Know the types of Artificial Intelligence.
- Know how to solve problem with Artificial Intelligence.

will be able to (skills):

- explain the key concepts of Artificial Intelligence.
- analyse AI problems.
- identify various type of AI and their applications.
- communicate the different tools used by AI.
- communicate AI use cases.

and will (competences)

- be able to operation principles of AI, and to know how to use.
- be able to theoretical and practical skills apply AI to real-world problems.

<u>Content:</u>

- What is Artificial Intelligence
- A Brief History of Artificial Intelligence
- Types of Artificial Intelligence
- How Does Artificial Intelligence Work?

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 2 Hours

Total ECVET Points: 0.07

5.8.2 Artificial Intelligence (AI-HDS8-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- understand basic methods of Classical AI.
- understand the applications of AI.
- understand the advantages and disadvantage of Artificial Intelligence
- understand Knowledge Representation Methods.
- understand the types of Knowledge in AI.

After the successful completion of this unit learners will (knowledge):

will be able to (skills):

- demonstrate basic principles of Artificial Intelligence
- apply the most common knowledge Representation Methods

and will (competences)

- be able to recognize different types of Knowledge in AI
- be able to understand Representation Methods
- be able to understand basic methods of Classical AI

Content:

- Ways of Implementing AI
- Major components of AI
- Advantages of Artificial Intelligence
- Disadvantages of Artificial Intelligence
- AI Approaches
- Basic Methods of Classical AI
- Applications of AI
- Data – Information – Knowledge – Wisdom
- Knowledge Representation Methods
- Rules

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 2 Hours

Total ECVET Points: 0.07

5.8.3 Artificial Intelligence (AI-HDS8-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- understand the Agents in AI and Features of Environment

- knowledge of the basic principles of expert systems.

- Learn about fundamental methods in artificial intelligence.

- understand the role of Expert system.

- understand how to use Expert System.

- understand the applications of expert systems.

- the ability of artificial intelligence and expert systems how to apply in health.

will be able to (skills):

- Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
- Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- solve medium to hard problems from diverse expert systems application domains.

and will (competences)

- Empower scientific abilities to implement AI techniques with stakeholders to define their scopes, limitations, and social impacts.
- be able to build a rule-based expert system that addresses a real-world problem.

Content:
- Types of AI Agents
- Agents in Artificial Intelligence
- Agents in AI and Features of Environment
- Expert Systems in AI
- Advantages and disadvantages of ES in AI
- Structure of Expert Systems in AI
- Development and Operation of an ES
- Applications of ES
- Inference Mechanism
- Acquisition of knowledge
- Artificial Intelligence Languages

-

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

5.9 Data Analytics and Visualization (DAV-HDS9)

Description:

In this educational module, learners will be introduced to Data analytics and the basics of data mining within the context of a wide variety of health care settings, and the types of data and data analysis challenges. The aim of the educational module is to learn the learners, how to gather the data, move on to classify analyze and finally visualize it. Learners will complete quizzes to apply their newly acquired skills and knowledge.

5.9.1 Data Analytics and Visualization (DAV-HDS9-I)- Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- understand the fundamental principles Data Visualization.
- know the key concepts of Data Analytics and Visualization,
- understand the types of Data Analytics.
- understand Data Analytics Tools.
- understand how to solve problem with Data analytics and visualization.

will be able to (skills):

- have knowledge the principle of Data Analytics Visualization

- have an overall knowledge of the fundamental principles of data analytics and information graphics.

and will (competences)

- be able to deal with information and statistical graphics.
- be able to operation principles of Data Analytics tools.
- be able to operation principles of Data Visualization tools.

Content:
- What is Data Analytics?
- Types of Data Analytics
- Data Analytics Tools
- Data Visualization

Training Methods:
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 2 Hours

Total ECVET Points: 0.07

5.9.2 Data Analytics and Visualization (DAV-HDS9-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know the types of analytics data analysis techniques.
- Know the benefits of Healthcare Data Analytics.
- Know basic data analytics methods for healthcare.
- Understand of Healthcare Data Sources and Basic Analytics.
- Know benefits of Healthcare Data Analytics.

will be able to (skills):

- apply common Data Visualization techniques and methods to real datasets.
- communicate the different software tools and programs used for Data Visualization
- apply predictive analytics in health care.
- have knowledge of categories of visualization and application areas

and will (competences)

- be able to make data analytics and visualization.
- be able to recognize different analytics techniques and visualization.

Content:
- Types of Analytics
- Data Analysis Techniques
- Data Analysis Process
- What is data analytics in healthcare?
- Benefits of Healthcare Data Analytics
- Healthcare Data Sources and Basic Analytics
- Data analytics methods for healthcare

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hours

Total ECVET Points: 0.23

5.9.3 Data Analytics and Visualization (DAV-HDS9-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- understand the Difference Between Data Visualization and Data Analytics
- Learn about types of Visualization.
- understand data visualization tools and how to use them.
- understand of Data visualization tools and how to apply in health.

will be able to (skills):

- Provide skills to prepare, analyse, visualize, and communicate health and healthcare.
- Apply data visualization tools for healthcare.
- effectively communicate data.
- promote visual communication.
- perform visual data in massive representations of data.

and will (competences)

- be able to use visualization tools.
- be able to analyse the visualize data.
- be able to use methods and approaches employed in condensing information, gathering, examining, and handling data in the healthcare field.

Content:
- What is data visualization?
- Why is Data Visualization Important?
- Difference Between Data Visualization and Data Analytics
- Data visualization in the healthcare
- Data Visualization Tools

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

5.10 Statistics (S-HDS10)

Description:

In this educational module, learners will be introduced to statistics and its use for about key statistical concepts like sampling, uncertainty, variation, missing values, and distributions. The aim of the educational module is to get the learners a detailed knowledge of R, one of the most widely used and versatile free software packages around and its libraries and packages for inferential statistical analysis, visualization, and machine learning algorithms. Learners will complete quizzes to apply their newly acquired skills and knowledge.

5.10.1 Statistics (S-HDS10-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- understand the main features of traditional and modern statistics.

- demonstrate understanding of variables, their scales of measurement, descriptive statistics, and preliminary data analysis.

- understand Qualitative and Quantitative variables.

- Know the basic concepts of the descriptive statistics.

- Understand the inductive Statistics and their applications.

will be able to (skills):

- effectively analysing statistical data.

- Apply the key characteristics of conventional and contemporary statistics.

- Apply of statistical methods relevant to health data.

- perform visual data mining in massive representations of data,

and will (competences)

- become more effective in descriptive Statistics.
- demonstrate how to apply and interpret descriptive statistics.

Content:
- Introduction to quantitative research
- Types of research
- Types of Variables and Research Design
- Qualitative variables
- Quantitative variables
- Descriptive statistics
- Measures of central tendency and measures of dispersion
- Inductive Statistics

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 1 Hour

Total ECVET Points: 0.04

5.10.2 Statistics (S-HDS10-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Learn how to utilize a statistical computer software application (like SPSS) to arrange, examine, and condense data sets in practical situations.
- Understand the ideas of correlation and regression and describe their application in analysing data.

will be able to (skills):

- basic statistical analysis and communication of ideas.
- use SPSS Program.
    - Interpretation
    - Pearson
    - Spearman
    - T- test
    - Normal distribution test
    - Independent samples t-Test
    - Dependent samples t-test

and will (competences)

- Able to communicate statistical results and their implications to the world
- Able to use SPSS tools in statistical analysis.
- developing practical skills on the application statistical analysis in health domain
- able to solve real world problems.

Content:
- Correlation (or Relevance)
- Relevance - Correlation coefficient
- Relevance - Types of association
- Relevance - Size of correlation
- Relevance - Statistical criteria of association
- r – Calculation
- Relevance - Assumptions Testing

- Relevance - Scatter plot
- Relevance – Scatter plot and Outliers
- Outliers
- Absence of outliers
- Types of correlations
- Interpretation
- Pearson
- Spearman
- T- test
- Normal distribution test
- Independent samples t-Test
- Dependent samples t-test

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 5 Hours

Total ECVET Points: 0.23

5.10.3 Statistics (S-HDS10-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- understand regression models and associated methods.
- understand simple and multiple Linear Regression and how to use SPSS.
- understand ANOVA and 2-way ANOVA.

will be able to (skills):

- Able to perform statistical analyses such as t-test, Simple and Multiple linear Regression, one-way and two-way ANOVA, Chi-squared, etc
- developing practical skills on the application statistical analysis in health domain

-   use SPSS program for statistical problems.

and will (competences)

-   Able to manipulate, analyses concepts and mastery of statistical methods in regression and linear models, and their applications including statistical computing.

-   Solve statistical problems, both theoretically and using statistical software.

Content:

-   Regression-correlation
-   Simple and multiple regression
-   Simple Linear Regression
-   Descriptive
-   Simple regression conditions
-   Multiple Linear Regression
-   1-way ANOVA
-   Analysis of variance
-   Multiple ANOVA
-   F statistic
-   Multiple comparisons
-   Effect size
-   2-way Anova
-   Factorial designs
-   Hypotheses in two-way Anova
-   Interaction

Training Methods:

-   Self-paced online training

-   Asynchronous online training

-   Learner-centred content

-   Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

5. Healthcare & Safety (HS)

Healthcare & Safety (HS) Course consists of the following eight modules:

- Introduction Healthcare & Safety (I-HS1)

- Health and Radiation (HR-HS2)

- Radiation Safety (RS-HS3)

- Patient Safety (PS-HS4)

- Mobile Health Technologies (MHT-HS5)

- Telehealth and Telemedicine (TT-HS6)

- Healthcare Policy (HP-HS7)

- Quality Improvement in Health IT (QI-HS8)

In figure 5 present the Healthcare and Safety Module and training units.
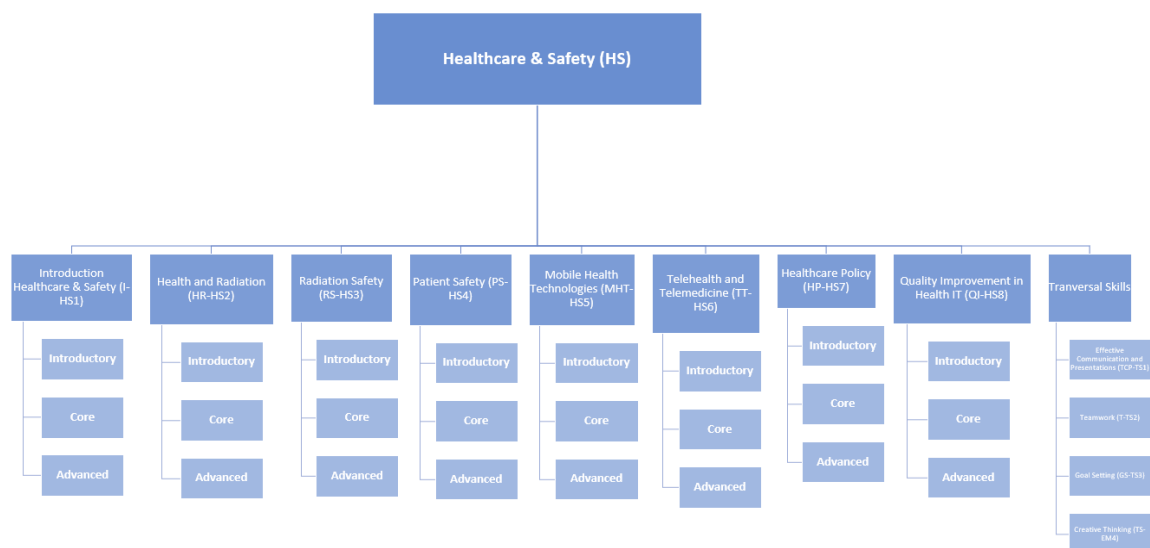
Figure 5 Healthcare and Safety and training units

6.1 Introduction Healthcare & Safety (I-HS1)

Description:

This educational module consists of an introduction to Healthcare & Safety. It aims to make the learners familiar with to the knowledge and skills needed to lead patient safety and quality improvement initiatives at the micro and macro levels. Learners will complete quizzes to apply their newly acquired skills and knowledge.

6.1.1 Introduction Healthcare & Safety (I-HS1-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- know the key concepts of healthcare & safety.
- have an overall knowledge of the fundamental principles of health workers safety and the linkage to patient safety.
- know of the Five steps to improve health workers safety.

will be able to (skills):

- Identify harmful risks in daily working life.
- aware of risks for workers and patients.

and will (competences)

- Implementing the five steps to improve health workers safety.
- Research on occupational and patient safety regulations and directives for the professional's workspace.

Content
- Definition Health & Safety
- Worker's health and safety
- Definition Patient safety
- Five steps to improve health workers safety.
- EU competence and legislation

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 2 Hours

Total ECVET Points: 0.07

6.1.2 Introduction Healthcare & Safety (I-HS1-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Understand the relevance of quality management systems.
- Know the DIN EN ISO 9001:2015.
- Get a brief information on existing ISO standards in health.
- Have an overview on the Medical Devices Regulations.
- Know the steps of Medical Devices from development till release on the market.
- Know the EUDAMED database and its content.

will be able to (skills):

- Identify unexpected outcomes in the working sector.
- Follow the relevant regulations on (In Vitro Diagnostic) Medical Devices
- Find information on medical devices on EUDAMED.

and will (competences)

- Able to apply the PDCA-cycle for process management.
- Able to observe quality management systems and processes.
- Able to react in case of unexpected outcomes due to medical devices error.
- Able to use available data of medical devices for shared decision making with patients.

Content

- International Organization of Standardization
- DIN/EN ISO 9001:2015
- ISO standards in health
- Medical Devices Regulation
- In Vitro Diagnostic Devices Regulation

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hours

Total ECVET Points: 0.2

6.1.3 Introduction Healthcare & Safety (I-HS1-A)- Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know different healthcare systems.
- Know the indicators of the health at glance report.
- Know different financing and organisational structures of healthcare systems.
- Know the Digital Health Index and its subindices.

- Compare Digital Health Index of countries.

will be able to (skills):

- analyse the healthcare system the professional is working in.
- analyse and recognize the digital processes of the workspace, region, country.

and will (competences)

- educate patients about risk factors with the background of a countries' health status and expenditures.
- able to research patient information websites of good quality to support the professionals' care.
- able to provide relevant available information about related condition.
- Analyse digital role models in other countries and transfer process ideas to workspace.

Content

- Health at glance report, Europe 2022
- Healthcare systems in EU member states
- Digital Health Index

Training Methods:
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

6.2 Health and Radiation (HR-HS2)

Description:

In this educational module, learners will be introduced to Health and Radiation. It aims

to make the learners to provide all the necessary information and abilities to successfully understand both ionising and non-ionising types of radiation materials and, how to effectively manage these radiation materials safely and with confidence to ensure personnel health and safety and/or to prevent potential environmental impacts. Learners will complete quizzes to apply their newly acquired skills and knowledge.

6.2.1 Health and Radiation (HR-HS2-I)-Introduction

<u>Learning outcomes</u>

After the successful completion of this unit learners will (knowledge):

- introduce to Health and Radiation.
- Know all the necessary information and abilities to successfully understand both ionising and non-ionising types of radiation materials.

will be able to (skills):

- identify how to effectively manage these radiation materials safely and with confidence to ensure personnel health and safety and/or to prevent potential environmental impacts.

and will (competences)

- able to recognize the radiological materials.
- able to use these radiological materials with confidence to ensure the health and safety of personnel and/or to prevent potential environmental impact.

<u>Content</u>
- What is radiation, how are people exposed to it?
- Effects of an excessive exposure to radiation
- Radiation emergency and the role of the WHO
- Sources of radiation
- Average annual dose

<u>Training Methods:</u>
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

<u>Assessment Methods</u>: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

<u>Total Training Hours</u>**:** 2 Hours

<u>Total ECVET Points:</u> 0.07

6.2.2 Health and Radiation (HR-HS2-C)-Core

<u>Learning outcomes</u>

After the successful completion of this unit learners will (knowledge):

- to understand successfully both ionising and non-ionising types of radiation material.
- on the patient safety and their own protection.

will be able to (skills):

- identify the knowledge how to effectively manage these radiation materials safely and with confidence to ensure personnel health and safety and/or to prevent potential environmental impacts.

and will (competences)

- able to combine several aspects of knowledge and skills will be educated.
- able to use the new knowledge in a work environment, also with special care to the aspects not only to patient safety but as well to their own safety.

<u>Content</u>
- Radiation basics
- Non-ionizing and ionising radiation
- United states environmental protection agency (EPA)
- Sources and doses
- Cosmic radiation
- Man made sources

<u>Training Methods:</u>
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 7 Hours

Total ECVET Points: 0.23

6.2.3 Health and Radiation (HR-HS2-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- understand and use all the necessary information and abilities for a successful work and protection of themselves and patients.

will be able to (skills):

- follow principles of radiation protection for patient, self, and others
- prepare and construct equipment, such as immobilization, treatment, and protection devices.

and will (competences)

- able to make his own research during the work.
- able to get trained, where to find evidence-based knowledge to integrate into his work.

Content
- Health effects of radiation.
- Dosimetry.
- The role of the European Commission
- The skin dose.
- Dose and health effects.
- Patient safety in medical imaging.

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 9 Hours

Total ECVET Points: 0.3

6.3 Radiation Safety (RS-HS3)

Description:

In this educational module, learners will be introduced to radiation safety as specified by the Health and Safety Executive and is specific to X-ray systems only. The aim of the educational module is to learn the learners the various types and harmful properties of ionising and non-ionising radiation and to understand key radiation safety management and protection principles. Learners will complete quizzes to apply their newly acquired skills and knowledge.

6.3.1 Radiation Safety (RS-HS3-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Understand basic concepts of radiology and radiation safety.
- Knowledge of the types of radiation, their effects on the human body, and protective measures against radiation exposure.

will be able to (skills):

- organize resources and establishing priorities.
- Recognize potential radiation incidents to personnel's health and/or the environment.

and will (competences)

- identify radiation safety measures and their importance in healthcare settings.
- the need for ongoing education in radiation safety for healthcare professionals.

Content

- Introduction Radiation Safety.
- Radiation safety in Radiology.
- Types of Radiation.
- Effects on human body from radiation.
- Measures in preventing the effects and minimize exposure.
- Training and Education of healthcare professionals in Radiation Safety.

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 1 Hour

Total ECVET Points: 0.04

6.3.2 Radiation Safety (RS-HS3-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Gain in-depth knowledge of dose quantities, risks associated with ionizing radiation, and principles of radiation protection.
- Understand the allowable radiation doses for workers and the public and grasp the concepts of dose limits and diagnostic reference levels.

will be able to (skills):

- assess and manage radiation doses in various settings.
- apply principles of radiation protection in practice.

and will (competences)

- able to ensure safety and compliance with radiation regulations in healthcare settings.
- able to implement and manage radiation safety protocols effectively.

<u>Content</u>
- Dose Quantities
- Categories of exposures
- Human Radiation Risks
- International system of radiation protection
- Fundamental Principles of Radioprotection
- Diagnostic Reference Levels

<u>Training Methods:</u>
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

<u>Assessment Methods</u>: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

<u>Total Training Hours</u>**:** 4 Hours

<u>Total ECVET Points:</u> 0.04

6.3.3 Radiation Safety (RS-HS3-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- knowledge of radiation safety in specific contexts such as pregnancy, paediatric radiology, and interventional procedures.
- Understand complex scenarios involving radiation exposure and management.

will be able to (skills):

- manage radiation safety in complex and high-risk scenarios.
- Advanced proficiency in radiation dose calculation and optimization.

and will (competences)

- Ability to implement advanced radiation safety protocols in varied clinical situations.
- Competence in educating others about radiation risks and safety measures.

Content
- Importance of Radiation Safety:
- During pregnancy
- In pediatric examination
- Applications in Computer Tomography
- Applications in Interventional Radiology

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

6.4 Patient Safety (PS-HS4)

<u>Description:</u>

In this educational module, learners will be introduced to patient Safety. The aim of the educational module is to provide healthcare practitioners and others with an introduction to the knowledge and skills needed to lead patient safety and quality improvement initiatives at the micro and macro levels. The learners will learn the foundations of health care quality and the science underlying patient safety and quality improvement and to analyze patient safety problems and processes using tools such as human factors analysis, etc. Learners will complete quizzes to apply their newly acquired skills and knowledge.

6.4.1 Patient Safety (PS-HS4-I)-Introduction

<u>Learning outcomes</u>

After the successful completion of this unit learners will (knowledge):

- introduction patient Safety.
- Know why patient safety is important.

will be able to (skills):

- practical aspects which a professional should be able to apply in a work.

and will (competences)

- Ability to health care quality and the science underlying patient safety and quality improvement.

   <u>Content</u>
   - The goal of this module is to introduce and to deepen the knowledge about the very important chapter of "Patient safety"
   - Introduction of many different solutions and development
   - Introduction of the European Patients Forum
   - Occurence of errors
   - The burden of harm
   - Adverse events and error phenomena

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 2 Hours

Total ECVET Points: 0.07

6.4.2 Patient Safety (PS-HS4-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- deepen their knowledge about the most important theme of patient Safety.
- Understand to lead patient safety and quality improvement initiatives at the micro and macro levels.

will be able to (skills):

- practical aspects which a professional should be able to apply in a work.

and will (competences)

- To increase patient safety and health care quality the health care practioner will learn how to create a culture to integrate patient safety in his workplace.
-
- Therefore it is necessary to improve the own knowledge continuously.

Content
- evidence based knowledge to develop solutions for "Patient Safety"
- The WHO and Patient and Safety

- Multi-professional patient safety guide
- Learning from errors to prevent harm
- Life long learning
- Solutions as increasement of digital competence or using artificial intelligence
- EFPIA
- Error culture
- CIRS

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

6.4.3 Patient Safety (PS-HS4-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know the strategies and programmes to increase Patient Safety
- have a detailed knowledge of advanced facts of radiology for patient safety.
- have knowledge of Patient safety curriculum guide

will be able to (skills):

- improvement and to analyse patient safety problems and processes using tools such as human factors analysis.

and will (competences)

- To analyse patient safety problems and use tools such as human factors analysis.

Content:

- Deepen the knowledge of strategies and programmes to increase Patient Safety
- Prevention of healthcare-associated infections
- Patient safety curriculum guide
- Facts of radiology for patient safety
- Being an effective team player

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

6.5 Mobile Health Technologies (MHT-HS5)

In this educational module, learners will be introduced Mobile Health Technologies. The aim of the educational module is to provide the use of mobile and wireless technologies, to support the achievement of health objectives and to connect relevant development theories to the technological strategies and tools. The learners will learn topics such as model of a mobile health system, technical terms, mobile computing technologies, healthcare-medical applications and mobile Computing and Application Development. Learners will complete quizzes to apply their newly acquired skills and knowledge.

6.5.1 Mobile Health Technologies (MHT-HS5-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- introduced to mobile health technologies.
- provide the use of mobile and wireless technologies, to support the achievement of health objectives and to connect relevant development theories to the technological strategies and tools.

will be able to (skills):

- practical aspects which a professional should be able to apply in a work.
- data management skills, communication skills, technical skills and data analytics

and will (competences)

- To increase patient safety and health care quality the health care actioner will learn how to create a culture to integrate patient safety in his workplace.
- Increase efficiency in managing patient data and communication through digital tools.

Content
- Mobile Health Technologies- Introduction
- Brief History of Mobile Health Technologies
- The importance of mobile health technologies (mHealth) in healthcare

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 2 Hours

Total ECVET Points: 0.07

6.5.2   Mobile Health Technologies (MHT-HS5-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- deepen to mobile health (mHealth) technologies.
- the use of mobile and wireless technologies, to support the achievement of health objectives and to connect relevant development theories to the technological strategies and tools.

    will be able to (skills):

- practical aspects which a professional should be able to apply in a work.

and will (competences)

- be able to use the different models mentioned in the introduction section and enrich their knowledge on the topic.

- be able to identify examples of best practices in mHealth solution development scenarios.

- Identify and obtain resources for additional information about mHealth.

Content

- Mobile Health Technologies Telemedicine
- Remote patient monitoring
- Health Tracking and Management Tools
- Health Information and Resources
- Clinical Decision Support Systems
- mHealth Apps for Self-Care and Wellness
- Mobile Health Data Management Systems

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 6 Hours

Total ECVET Points: 0.2

6.5.3 Mobile Health Technologies (MHT-HS5-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- introduced to mobile health technologies.
- provide the use of mobile and wireless technologies, to support the achievement of health objectives and to connect relevant development theories to the technological strategies and tools.

will be able to (skills):

- Write a proposal for a mHealth system or framework.

and will (competences)

be able to analyse the aforementioned models and understand their application.

Content

- Telemedicine
- Remote Patient Monitoring (RPM)
- Health Tracking and Management Tools
- Health Information and Resources
- Clinical Decision Support Systems (CDSSs)
- mHealth Apps for Self-Care and Wellness
- Mobile Health Data Management Systems
- Example of the monitoring devices
- Mobile health technologies (mHealth) offer several advantages for healthcare delivery

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 10 Hours

Total ECVET Points: 0.33

6.6   Telehealth and Telemedicine (TT-HS6)

Description:

In this course, students will be introduced to the key components and considerations

needed to design and implement a successful telemedicine program at both the practice and health system levels. The aim of the educational module is to emphasize operational design principles and highlights a team-based approach and the key content areas include clinical considerations, patient safety, technology needs, patient satisfaction, legal, government affairs, regulatory and compliance, and billing considerations. Learners will complete quizzes to apply their newly acquired skills and knowledge.

6.6.1 Telehealth and Telemedicine (TT-HS6-I)-Introduction

<u>Learning outcomes</u>

After the successful completion of this unit learners will (knowledge):

- Provide a historical overview of the main applications of telemedicine and telehealth and the key policy drivers for telehealth in the 21st century.
- Discuss the often complex legal, regulatory, accountability and reimbursement issues surrounding telehealth.

will be able to (skills):

- Demonstrate the use of telehealth tools in health and research

and will (competences)

- Recognise the value of critically examining user contexts for effective telehealth design, and how this can be achieved.
- Identify and address a range of sociotechnical factors that influence the success or failure of implementation projects.
- Apply principles and methods of evaluation to telehealth projects.

Content

- Telehealth and Telemedicine- Introduction
- Brief History of Telehealth and Telemedicine
- Types of Telehealth and Telemedicine Services
- Advantages of Telehealth and Telemedicine
- Challenges of Telehealth and Telemedicine
- Conclusion on Telehealth and Telemedicine

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 2 Hours

Total ECVET Points: 0.07

6.6.2 Telehealth and Telemedicine (TT-HS6-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- will deepen the key components and considerations needed to design and implement a successful telemedicine program at both the practice and health system levels.
- the challenges will be pointed out expressing how important is funding for the development and implementation of telehealth and telemedicine services.

will be able to (skills):

- Identify areas in clinical, educational and research services where telehealth are being applied.

and will (competences)

- learn how to use the different models mentioned in the introduction section and enrich their knowledge on the topic.
- recognize the role of telehealth applications in improving population health.

Content

- Telehealth and Telemedicine
- Benefits of Telehealth and Telemedicine
- Examples of Telehealth and Telemedicine services

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 7 Hours

Total ECVET Points: 0.23

6.6.3 Telehealth and Telemedicine (TT-HS6-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Discriminate between the different telemedicine modalities to determine which clinical skills will best optimize the use of the available modality.
- Differentiate between telehealth and telemedicine.
- Outline different components of Digital Health and Telemedicine
- Critique applications of telemedicine in diagnosis, intervention, monitoring

and treatment.

- Explain the advantages and challenges in implementing Electronic Health Record and ehealth systems.
- Outline legal and regulatory considerations in implementing telemedical care.

will be able to (skills):

- Identify applications that are suited for different telehealth environments.

and will (competences)

- Identify the main types of teleconsultations for a better understanding of how telehealth works at the first level of care.
- Describe the normative regulations, ethics, and communication strategies necessary for the operation of telehealth at the first level of care.
- Explain the main barriers that telehealth faces at the first level of care to facilitate the operation of telehealth services.
- Contextualize learning about prevention, promotion, diagnosis, monitoring, and treatment of non-communicable diseases in different scenarios.

Content

- Electronic Health Records (EHRs)
- mHealth
- Artificial Intelligence (AI) and Machine Learning (ML)
- Virtual Reality (VR) and Augmented Reality (AR)
- Benefits of Wearable Devices in Telehealth

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 9 Hours

6.7 Healthcare Policy (HP-HS7)

Description:

In this course, students will be introduced to the key components and considerations needed to design and implement a successful telemedicine program at both the practice and health system levels. The aim of the educational module will become familiar with principles and theories of global health problems, and major challenges and controversies in improving global population health as well as practical applications of quantitative methods to analyse and interpret issues and challenges for policy. The education module will cover topics such as health and foreign policy, health governance, acute disease surveillance, non-communicable diseases, burden of disease and universal health coverage. Learners will complete quizzes to apply their newly acquired skills and knowledge.

6.7.1 Healthcare Policy (HP-HS7-I)-Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know the basics of health policy.
- Have a general knowledge of the 4 health policy determinants.
- Have a general knowledge of the characteristics of health policy.
- Knowledge of health policy in Europe.
- Have a general knowledge of the key areas of healthcare institutions in Europe.

will be able to (skills):

- Explain the basics of health policy in Europe.
- Explain the 4 determinants of health.
- Understand the characteristics of health policy.
- Identify the key areas of health institutions in Europe.

and will (competences)

- Recognize of different health policies across Europe.
- Recognize of health determinants.
- Recognize the characteristics of health policies.
- Recognize different health institutions in Europe.

Content

- Health and foreign policy,
- Health governance,
- Acute disease surveillance in the EU (ATLAS)

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 2 Hours

Total ECVET Points: 0.07

6.7.2 Healthcare Policy (HP-HS7-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Know the basics of the healthcare institution in detail
- Have a general knowledge of the journey of a medicine assessed by EMA

- Have an overall knowledge of Global Health
- Know the challenges in Global Health
- Have an overall knowledge about the tasks of the World Health Organisation (WHO)

will be able to (skills):

- Understand the tasks of different institutions in health policy in Europe
- Explain the journey of a medicine assessed by EMA
- Understand the perspectives of the healthcare in Europe
- Explain and understanding the term Global Health
- Identify the challenges in Global Health
- Explain of the tasks of the World Health Organisation (WHO)

and will (competences)

- Recognize the tasks of different institutions in health policy in Europe.

- Recognize the journey of a medicine assessed by EMA.

- Recognize the perspectives of the healthcare in Europe.

- Recognize the term Global Health

- Recognize the challenges in Global Health

- Recognize the tasks of the World Health Organisation (WHO)

Content
- Acute disease surveillance in the EU (ATLAS)
- Global Health problems and challenges
- Design and implement a telemedicine program.

Training Methods:
- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

6.7.3 Healthcare Policy (HP-HS7-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Knowledge of theories of software development life cycle models
- Knowledge of telehealth programme evaluation
- Have a general knowledge of change management models.

will be able to (skills):

- Explain and apply theories of software development life cycle models.
- Explain and apply telehealth programme evaluation methods.
- Understand change management models.

and will (competences)

- Understand theories of software development life cycle models.
- Recognise methods for evaluating telehealth programmes.
- Recognise models of change management.

Content

- Design and implement a telehealth program.
- Software Development Life Cylce Models.
- Evaluation of an electronic health intervention.
- Models of change management.

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

6.8 Quality Improvement in Health IT (QI-HS8)

Description:

In this educational module, learners will be introduced complexity and quality improvement in health and social care. The aim of the educational module is to provides topics such as Engagement and co-production, Systems modelling and quality improvement, capacity problems and computer simulation modelling. Learners will complete quizzes to apply their newly acquired skills and knowledge.

6.8.1 Quality Improvement in Health IT (QI-HS8-I)- Introduction

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- introduced to complexity and quality improvement in health and social care.
- Explain the fundamental principles and state of the evidence on quality and quality improvement.
- Analyse work processes and performance using key quality improvement tools
- identify effective strategies for fostering a context that supports quality

will be able to (skills):

- choose appropriate outcome to assess progress
- Understand the importance of building sustainability into a project

and will (competences):

- how to use the different models mentioned in the introduction section and enrich their knowledge on the topic.

Content

- Quality Improvement in Health IT
- Explanation of Quality Improvement in Health IT

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 2 Hours

Total ECVET Points: 0.07

6.8.2 Quality Improvement in Health IT (QI-HS8-C)-Core

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- will deepen into complexity and quality improvement in health and social care.
- Key components along with the impact of quality improvement in health IT are presented.
- Implement Quality Improvement, Risks and challenges of implement quality improvement and Quality Improvement Tools and Techniques

will be able to (skills):

- define quality improvement and how it differs from audit.
- Understand what a system is and how it relates to healthcare.
- Know some of the theory behind failures in healthcare systems.

and will (competences)

- how to use the different models mentioned in the introduction section

and enrich their knowledge on the topic.

Content

- Quality Improvement in Health IT
- Electronic Health Records (EHRs)
- Patient Engagement:
- Data Analytics

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

6.8.3 Quality Improvement in Health IT (QI-HS8-A)-Advanced

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- show how to improve the quality of patient care and healthcare delivery.
- Complexity and quality improvement in health and social care
- Evaluating quality improvement: the lens of profound knowledge, measuring for improvement
- Systems modelling and quality improvement: modelling for demand and capacity problems and computer simulation modelling.
- Making the case for quality improvement

will be able to (skills):

- understand how to put in practice their skills and knowledge.

and will (competences)

- analyse the aforementioned models and understand their application.

Content

- Quality Improvement in Health IT
- Clinical decision support (CDS) systems
- Electronic health records (EHRs)
- Regulatory and legal considerations

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 8 Hours

Total ECVET Points: 0.27

6. Transversal Skills (TS)

Transversal skills typically have high transferability across different jobs and sectors. Transferable skills are essential on many levels and are crucial for in building in public sector career path as they enable to transfer between roles, departments, or organizations. It aims to build upon academic and experiential learning and to prepare the health professional for engaging within the business environment in a creative way, communicating effectively with the internal and external environment of a business and acting in a collaborative way.

We will introduce modules that provide a portfolio of skills and competencies required for effective communication and presentation, teamwork, goal-setting and creative thinking. The transversal skills curriculum includes the following educational modules:

- Effective Communication and Presentations (TCP-TS1)
- Teamwork (T-TS2)
- Goal Setting (GS-TS3)
- Creative Thinking (EM-TS4)

7.1 Transversal Skills (TS) (TCP-TS0)

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Define transversal skills and competencies.
- Explain the importance of transversal skills in the modern workplace and healthcare sector.
- Identify common examples of transversal skills in the healthcare sector and the digital era.
- Explain the relationship between transversal skills and self-awareness and self-knowledge.

will be able to (skills):

- Demonstrate effective communication skills in healthcare settings, including patient care, teamwork, and digital interaction.
- Apply critical and creative thinking skills to solve complex healthcare problems.
- Exhibit adaptability to adjust to changing situations in the healthcare sector and the digital era.
- Demonstrate cultural competency by respecting the cultural beliefs and practices of patients and their families.
- Apply data analysis skills to interpret data from various sources to make informed decisions about patient care.
- Apply project management and design thinking skills to manage complex digital health initiatives and design user-centered solutions to healthcare problems.

and will (competences)

- Demonstrate proficiency in using various digital tools and technologies to support patient care.
- Protect patient health information and secure digital systems from cyber threats.
- Work collaboratively with others to provide coordinated, high-quality care to patients.
- Generate new and innovative ideas to solve complex healthcare problems.

Content

- Introduction to transversal skills in healthcare

- Characteristics of transversal competencies

- Overview of transversal skills in the healthcare sector

- Importance of transversal skills in the digital era

- Key transversal skills for healthcare professionals

- Strategies for developing transversal skills

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 4 Hour

Total ECVET Points: 0.14

7.2 Effective Communication and Presentations (TCP-TS1)

Description:

In this educational module, provide to the learner's knowledge and skills for effective communication and presentation. Also, in this module will be covered the following topics: Principles of effective communication, Active listening, Barriers to communication and Effective presentations.

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Describe the necessary components of effective digital communication in the healthcare industry.
- Explain the appropriate ways of communicating through digital means.
- Identify the potential obstacles that may hinder effective communication.
- Define active listening and its attributes, such as attention, understanding, feedback, empathy, questioning, reflecting, responsiveness, privacy and security, and follow-up.
- Recognise the individual and external factors that influence effective communication among health professionals.
- understand how to modify your communication approach based on the message's scope and the comments you receive.
- possess a general understanding of the ideas behind powerful presentation design

will be able to (skills):

- Interact through a variety of digital devices and applications.
- Refer to different communication formats.
- Adapt communication modes and strategies to the specific audience.
- Collaborate through digital channels for teamwork, collaborative processes, and co-creation of resources, knowledge, and content.
- Create, adapt and manage one or multiple digital identities.
- Protect one's e-reputation and deal with the data that one produces through

several accounts and applications.
- Use active listening to gain information, understand patient's perspective and needs, and provide feedback to indicate listening and engagement.
- Ask open-ended questions, reflect back what has been heard, respond in a timely and appropriate manner, and ensure privacy and security of the conversation.

and will (competences)

- Participate in society through online engagement.
- Seek opportunities for self-development and empowerment in using technologies and digital environment.
- Be aware of the potential of technologies for citizen participation.
- Develop active strategies to discover inappropriate behaviour.
- Acknowledge and summarise patient's cues, concerns or questions.
- Understand patient's experience of illness through recognising and exploring patients' cues.
- Follow-up on any issues or concerns to ensure they are addressed.

Content

- Importance of effective communication and presentation skills in the healthcare
- Elements for effective communication
- Definition of active listening
- Techniques for active listening
- Types of communication barriers
- Strategies for overcoming communication barriers in the healthcare
- Elements of effective presentations
- Examples of digital applications for communication in the healthcare

Training Methods:
- Self-paced online training
- Asynchronous online training
- Learner-centred content
- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**: 4 Hour

Total ECVET Points: 0.14

7.2 Teamwork (T-TS2)

Description:

In this educational module, provide to the learner's knowledge and skills for effective team working. Also, in this module will be covered the following topics: The role of teamwork, Characteristics of effective teams, Responsibilities and roles within teams, Setting common goals, Developing a team, Team leadership and Effective communication in teams.

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Define collaborative practice in the healthcare sector and its importance in ensuring positive patient outcomes.
- Describe the aims of collaborative practice, including creating teams that optimise the skills of their members and moving healthcare systems from a state of fragmentation to a position of strength.
- Explain the role of digital technology in collaborative practice in healthcare.
- Discuss the characteristics of effective healthcare teams, including a shared goal of patient-centered care, clear roles and responsibilities, mutual trust, effective and open communication, measurable outcomes, and open, supportive, and visionary leadership.
- Describe the responsibilities and roles of different healthcare professionals in a collaborative practice team.

will be able to (skills):

- Demonstrate effective communication skills in a collaborative practice team, including active listening, clear and concise communication, and the ability to provide and receive constructive feedback.
- Apply interprofessional collaboration skills to real-life scenarios, such as team-

based patient care and problem-solving.

- Demonstrate the ability to use digital technology to enhance communication and collaboration in a healthcare team.
- Work effectively in a team-based environment, including the ability to work collaboratively, delegate tasks, and support team members.
- Establish common vision and objectives within a team.

and will (competences)

- Develop competence in interprofessional collaboration and communication skills.
- Demonstrate the ability to work effectively in a team-based environment, including managing conflicts and resolving problems.
- Apply critical thinking and problem-solving skills to team-based patient care scenarios.
- Use evidence-based practice to inform decision-making in a collaborative practice team.
- Understand the ethical and legal issues related to collaborative practice in healthcare and apply them to real-life scenarios.
- Promote the formation and development of teams in ICT environment.

Content

- Benefits of collaborative practice in healthcare
- Importance of teamwork in healthcare
- Characteristics of effective healthcare teams
- Understanding the responsibilities and roles of team members in healthcare
- Importance of setting common goals in healthcare teams
- Strategies for effective team leadership
- Effective communication in healthcare teams
- Examples of digital tools and applications for effective teamwork in healthcare
- Best practices for using digital applications in healthcare teams

Training Methods:

- Self-paced online training
- Asynchronous online training
- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours**:** 4 Hour

Total ECVET Points: 0.14

7.3 Goal Setting (GS-TS3)

Description:

In this educational module, provide to the learners knowledge and skills for effective goal setting. Also, in this module will be covered the following topics: Overcoming obstacles in goal setting and Effective goal setting.

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Describe the different contextual, structural, functional, and temporal characteristics of goals, and how they can help individuals and organisations to effectively set and achieve their objectives.
- Explain the goal setting theory and its five key principles according to Locke and Latham, and how they can be applied to improve performance and achieve goals.
- Outline the RAID model of Continuous Quality Improvement framework, and how it can serve as an example of a problem-based goal-setting approach in healthcare.
- Discuss the importance of involving all stakeholders, setting achievable and realistic goals, monitoring and measuring progress, effective communication, persistence, flexibility, and seeking help and guidance from experts to overcome obstacles in goal setting.

will be able to (skills):

- Develop clear, measurable, and achievable objectives for a specific area of healthcare, and develop a plan or strategy to achieve them.
- Identify key performance indicators, allocate resources, establish timelines, involve key stakeholders, monitor progress regularly, and track results to achieve goals effectively.
- Continuously review, evaluate, communicate progress and results, reward or acknowledge achievement, and learn from the experience to improve future goals and objectives.
- Use goal-setting tools and techniques.

and will (competences)

- Apply the knowledge and skills acquired to set and achieve goals that improve patient care, research, administration, and other critical areas in healthcare.
- Collaborate with all stakeholders, align goals with the overall mission and values of the health institution, and persistently and flexibly overcome obstacles in goal setting.
- include other people from their work environment into their goal setting process.
- Continuously learn from the experience, adapt to new information, research, and best practices, and apply the lessons learned to future goals and objectives.
- be competent in planning professional goals.

Content

- Definition and importance of goal setting in healthcare
- Types of Goals
- Goal-setting Theory
- Steps for effective goal setting
- Strategies for overcoming obstacles in goal setting.
- Characteristics of effective goals
- Specific, measurable, achievable, relevant, and time-bound (SMART) goals
- Importance of aligning goals with the organisation's mission and vision
- Classification of goals in healthcare
- Tools and technologies that can facilitate goal setting in healthcare.

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

Assessment Methods: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

Total Training Hours: 4 Hour

Total ECVET Points: 0.14

7.4 Creative Thinking (EM-TS4)

Description:

In this educational module, provide to the learners knowledge and skills for creative thinking. Also, in this module will be covered the following topics: Creative behaviour, Methods and techniques of creative thinking and Characteristics of a creative environment.

Learning outcomes

After the successful completion of this unit learners will (knowledge):

- Define creative thinking and its importance in various fields.
- Identify the components of creative thinking, such as flexibility, divergent thinking, originality, innovation, intuition, visualisation, open-mindedness, curiosity, risk-taking, and problem-solving.
- Describe the frameworks for creative behaviour, such as the Wallis Model of Creativity and the Honing Theory of Creativity.
- Explain the methods and techniques of creative thinking, such as brainstorming, mind mapping, problem-solving workshops, design thinking, role-playing, reverse engineering, SCAMPER, Delphi method, concept mapping, and simulation.
- Discuss the characteristics of a creative environment, such as openness and diversity, supportive leadership, encouraging risk-taking, collaboration and partnerships, continuous learning and professional development, empowerment, flexibility, feedback and constructive criticism, and recognition and rewards.

will be able to (skills):

- Apply the components of creative thinking to generate innovative and original ideas in different contexts.
- Utilise the frameworks for creative behaviour to support and develop creative behaviour in healthcare delivery, research, and administration.
- Utilise various methods and techniques of creative thinking to generate new ideas, solutions, and approaches to healthcare delivery, research, and administration.
- Create a creative environment by fostering openness and diversity, supportive leadership, encouraging risk-taking, collaboration and partnerships, continuous learning and professional development, empowerment, flexibility, feedback and constructive criticism, and recognition and rewards.
- Demonstrate the essential creative skills required to thrive in the digital era, such as digital literacy, multiliteracies, transmedia literacy, network literacy, and cultural and critical literacy.

and will (competences)

- Evaluate the effectiveness of creative thinking and its components in different contexts.
- Critique and analyse the frameworks for creative behaviour and their applications in healthcare delivery, research, and administration.
- Select and apply appropriate methods and techniques of creative thinking to generate innovative and effective solutions to healthcare problems.
- Design and implement a creative environment in healthcare settings to foster innovation and improve patient outcomes.
- Demonstrate proficiency in the essential creative skills required to succeed in the digital era, such as digital literacy, multiliteracies, transmedia literacy, network literacy, and cultural and critical literacy.

Content

- Attributes of creative thinking
- Creative behaviour and its importance in healthcare
- Methods and techniques of creative thinking in healthcare
- Characteristics of a creative environment in healthcare settings
- Creative skills in the digital era for healthcare professionals
- Examples of digital applications for creative thinking in healthcare

Training Methods:

- Self-paced online training

- Asynchronous online training

- Learner-centred content

- Personalization (self-study courses)

<u>Assessment Methods</u>: *Learners will complete quizzes to apply their newly acquired skills and knowledge.*

<u>Total Training Hours</u>**:** 4 Hour

<u>Total ECVET Points:</u> 0.14

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