

# 2020

## EXPERT3D

### Comprehensive Transversal Programme in Medical Image Postprocessing: 3D Printing and Artificial Intelligence

#### MODULE 1

INTRODUCTION: PRESENT AND FUTURE OF  
MEDICAL IMAGE APPLICATIONS

- GRADED ACTIVITIES: Final Bloc Questionnaires
- GRADED ACTIVITIES: Glossary ★
- GRADED ACTIVITIES: Final Work
- ENTRANCE AND EXIT SURVEY



- Welcome and Get Started (V)
- Introduction to Bloc 1 (V)
- Innovation in Medicine: Present and Future (V)
- Future of image diagnosis (V)
- 3D Printing (in Health) (V)
- AI (in Health) (V)
- Existing regulations and ethics in healthcare (V)
- Real examples: 3D printing in oncologic surgery (V)
- Real examples: 3D printing in maxillofacial surgery (V)
- Practical examples. Image applications in research (V)
- Real examples: Image and simulation (beyond 3DP) (V)
- End of bloc (V)



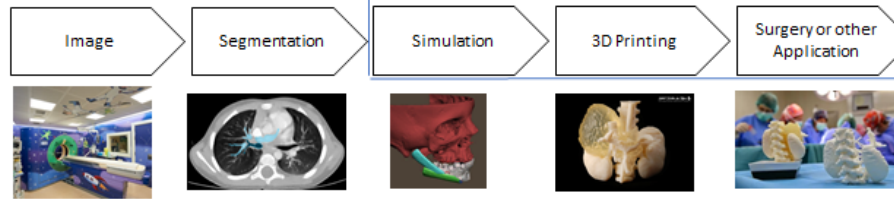
Dedicated time: 15h



EIT Health is supported by the EIT,  
a body of the European Union

#### MODULE 2

ANATOMY AND IMAGE TECHNIQUES



- Introduction to Bloc 2: acquisition of the medical image, techniques and optimization (V)
- [Anatomy] Anatomy of the soft tissues (thorax and abdomen)
- [Anatomy] Musculoskeletal anatomy
- [Anatomy] Cardiovascular anatomy
- [Anatomy] Anatomy of the central nervous system
- [Anatomy] Maxillary-face anatomy
- [Anatomy] Maternal-fetal anatomy
- [Technic] Update in medical imaging techniques I (TC)
- [Technic] Update in medical imaging techniques II (RM)
- [Technic] Update in medical imaging techniques III (Ecography)
- [Technic] Technical optimization of CT scan
- [Technic] Basic techniques of reconstruction (subtraction, multiplanar, MIP, MinP, volume rendering and surface)
- End of bloc (V)



Dedicated time: 25h

#### MODULE 3

IMAGE POST-PROCESSING, 3D PRINTING  
AND BIO-PRINTING

- Introduction to Bloc 3 (V)
- Basic post processing tools (V)
- [Portal] Segmentation with PORTAL (V)
- [Portal] Practical basic reconstructions (V)
- [Portal] Flip-class session for doubts
- [3D Tools] Basic concepts of 3D printing software, Formats and Matrices (V)
- [3D Tools] How to use a 3D software and STL file (V)
- [3D Tools] Creation of biomodels, surgery tools, cutting guides, implants and other modifications on the image (V)
- [3D Tools] Flip-class session for doubts for segmentation 😊
- [3D Printing] Additive manufacturing processes and types of 3D printers for medical applications (V)
- [3D Printing] Printing materials in biomedicine (V)
- [3D Printing] Visit CIM-UPC print Fab-farm 😊
- [Simulation] Simulation techniques workshop 😊
- [Bioprinting] Applications of Bioprinting in Medicine and Health (V)
- [Bioprinting] Biomaterials design and bioprinting (V)
- [Bioprinting] The significance of 3D bioprinting in regenerative medicine (V)
- [Bioprinting] Regulatory and biocompatibility in healthcare bioprinting (V)
- [Bioprinting] Bioprinting case studies (V)
- End of bloc (V)



Dedicated time: 35h

#### MODULE 4

FROM IMAGE TO AI AND RESEARCH

- Introduction to Bloc 4 (V)
- Visualization of 3D models (V)
- Normalization of the image for research (V)
- Tips in acquiring the image and specific software for segmentation (V)
- Individual segmentation, Lesion-symptom mapping, Interpretation and report of group cases (V)
- Introduction to machine learning in image analysis (V)
- Mathematical representation of digital images (V)
- Advanced image filtering techniques (2 classes) (V)
- Extraction of attributes and texture analysis (2 classes)
- Automatic classification and segmentation of images with AI techniques (4 tutorials) (V)
- Introduction to deep learning techniques (Convolutional Neural Networks, Deep Learning) (1 class) (V)
- [AI] Flip-class session for doubts 😊
- End of bloc (V)
- Tutoring Final Work



Dedicated time: 27h

- Presential
- Video (V)
- Lecture



65% Grade  
80% Assistance  
CERTIFICATE

7 weeks educational program (5 theoretical W + 1 hands-on + 1 final project)