**Welcome and Get Started**

Real examples: 3D printing in maxillofacial surgery

**Individual**

Real examples: Image and simulation (beyond 3DP)

AI (in health)

Introduction to Final Project

End of course: Remarks from Course Co-Directors

Basic post processing tools

End of course: Remarks from Course Co-Directors

**Introduction to Module 2: acquisition of the medical image, techniques and optimization**

[Anatomy] Anatomy of the soft tissues (thorax & abdomen)

[Anatomy] Musculoskeletal anatomy

[Anatomy] Cardiovascular anatomy

[Anatomy] Anatomy of the central nervous system

[Anatomy] Maxillary-face anatomy

[Anatomy] Maternal-fetal anatomy

[Technic] Update on medical imaging techniques I (TC)

[Technic] Update on medical imaging techniques II (RM)

[Technic] Update on medical imaging techniques III (Echography)

[Technic] Technical optimization of CT Scan

[Technic] Basic techniques of reconstruction (subtraction, multiplanar, MIP, MinP, volume rendering and surface)

**Introduction to Module 3: Basic post processing tools**

[Portal] Segmentation with PORTAL

[Portal] Flip-class session for doubts

[3D Tools] Basic concepts of 3D printing software, formats and matrices

[3D Tools] How to use a 3D software and STL file

[3D Tools] Creation of biomodels, surgery tools, cutting guides, implants and other modifications on the image

[3D Tools] Flip-class session for doubts

[3D Printing] Additive manufacturing processes and types of 3D printers for medical application

[3D Printing] Printing materials in biomedicine

[3D Printing] Visit CIM-UPC print Fab-farm

[Simulation] Simulation techniques workshop

**Introduction to Module 4: Visualization of 3D models**

[Portal] Segmentation with PORTAL

[Portal] Flip-class session for doubts

[3D Tools] Basic concepts of 3D printing software, formats and matrices

[3D Tools] How to use a 3D software and STL file

[3D Tools] Creation of biomodels, surgery tools, cutting guides, implants and other modifications on the image

[3D Tools] Flip-class session for doubts

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**Visualization of 3D models**

**Normalization of the image**

**Mathematical interpretation and report of group cases**

**Introduction to machine learning in image analysis**

**Mathematical representation of digital images**

**Advanced image filtering techniques (2 classes)**

**Extraction of attributes and texture analysis (2 classes)**

**Automatic classification and segmentation of Images with AI techniques (4 tutorials)**

**Introduction to deep learning techniques (Convolutional Neural Networks, Deep Learning) (5 class)**

[AI] Flip-class session for doubts

Tutoring Final Project

End of Module

**End of Module**

**Introduction to Final Project**

Dedicated time: 21h

**End of Module**

**Introduction to Final Project**

Dedicated time: 27h

**END OF COURSE: Remarks from Course Co-Directors**

**Dedicated time: 10 h**

**Dedicated time: 11 h**

**Dedicated time: 27h**

**Deadline: 2 weeks (Nov 30; Dec 7)**

**65% Grade**

**Glossary**

**Module 1: Introduction: Present and Future of Medical Image Applications**

Week 1: Oct 28 - Nov 3 (Barcelona)

Nov 4 - Nov 10 (Coimbra)

**Module 2: Anatomy and Image Techniques**

Week 2: Nov 4 - Nov 10 (Barcelona)

Nov 11 - Nov 17 (Coimbra)

**Module 3: Image Post-processing and 3D Printing for Healthcare Applications**

W3: Nov 11 - Nov 17 (Barcelona)

Nov 18 - Nov 24 (Coimbra)

**Module 4: From Image to AI and Research**

W4: Nov 18 - Nov 30 (Barcelona)

Nov 25 - Dec 7 (Coimbra)

**65% Grade**

**Glossary**

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