

**PhD in Information and Communication Technology for Health  
Università degli Studi di Napoli Federico II**

**Module Title**      **Application of Artificial Intelligence, 3D Models, and Augmented Reality in Plastic Surgery**

**Lecturer**      **SIMONE LA PADULA**  
**University of Naples Federico II**  
**Department of Public Health**  
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**CV** Professor Simone La Padula is a Specialist in Plastic Surgery and an Associate Professor at the Chair of Reconstructive and Aesthetic Plastic Surgery at the Federico II University Hospital in Naples. He spent eight years in Paris, working at the Department of Reconstructive Aesthetic and Maxillofacial Plastic Surgery at the Henri Mondor University Hospital. In France, he honed his expertise in facial, breast, and body aesthetic surgery, senology, and breast reconstruction, and joined the face transplant team. He regularly participates in international conferences, engages in research in the field of innovations in plastic surgery and regenerative medicine, and has authored numerous articles in international journals (<https://pubmed.ncbi.nlm.nih.gov/?term=la+padula+s&sort=date>). He is also involved in the training of young plastic surgeons. He has earned several university degrees from prestigious French universities, including the University of Paris XII and the University of Paris Descartes. He holds a Second-level Master's degree in surgical sciences from the University of Paris XII and two Ph.D. degrees in plastic and reconstructive surgery, one from the Campus Biomedico University in Rome and the other from the University of Paris XII. He coordinates a research, training, and collaboration agreement between Federico II University and the University of Paris XII. He collaborates with Harvard University: Harvard Medical School. In 2018, he became one of the youngest surgeons to obtain national scientific qualification as an Associate Professor, and in 2023, he obtained the national scientific qualification as a Full Professor.

**Lecturer: Endri Dibra**  
**University: ETH Zurich**  
**Department of Engineering Sciences**  
**[endri.dibra@arbrea-labs.com](mailto:endri.dibra@arbrea-labs.com)**

**CV** Dr Dibra worked for Disney Research, Vizrt Sports, and Compar in computer vision, robotics, and machine learning before pursuing his PhD at the Computer Graphics Laboratory of ETH Zurich under the guidance of Prof. Markus Gross, Vice President of Disney Research. His PhD, at the intersection between Visual Computing and Artificial Intelligence, focused on Reconstructing Digital Human Avatars from Monocular Imagery, which led him to co-found Arbrea Labs, a spin-off from ETH Zurich. He leads a team of top-tier experts in Visual Computing & AI, Healthcare Marketing, and Business Development, and in the last five years, Arbrea Labs has become one of the most promising deep tech start-ups on the Swiss scene and worldwide. The mission of Dr Dibra and his team is to revolutionize the healthcare industry by laying the foundation for shaping the next aesthetic reality, making the Medical Metaverse the meeting point between patients' demands and doctors' needs.

**TEACHING MODULE Announcement**

**ECTS Credits: 1.6**

**Dates and Locations [SUBJECT TO CHANGE]**

**(rooms are in ed.13, floor 2, Via S. Pansini 5, Napoli)**

Date	Hours	Room	Lecturer
20 May 2024 Lessons 1-3	10-13	Secondo Policlinico (also through MICROSOFT TEAMS) Edificio 13 Piano Terra	PROF LA PADULA
21 May 2024 Lessons 4-6	10-13	Secondo Policlinico (also through MICROSOFT TEAMS) Edificio 13 Piano Terra	PROF LA PADULA
22 May 2024 Lessons 7-8	10-12	Secondo Policlinico (also through MICROSOFT TEAMS) Edificio 13 Piano Terra	PROF LA PADULA Dr Endri Dibra

**Content**

**I Lesson - Introduction to plastic reconstructive and aesthetic surgery to understand the application of Artificial Intelligence, 3D Models, and Augmented Reality in Plastic Surgery.** In the ever-evolving landscape of medical science and technology, the intersection of Artificial Intelligence (AI), 3D modeling, and Augmented Reality (AR) has opened up new horizons for innovation and precision in the field of plastic surgery. This lecture delves into the exciting realm where cutting-edge technologies meet the artistry of surgical enhancement.

**II Lesson - Surgical procedures that can benefit from the application of Artificial Intelligence, 3D Models, and Augmented Reality.** The methods of flaps-based breast reconstruction, facial transplantation, head and neck reconstruction, as well as functional and aesthetic breast surgeries will be illustrated.

**III lesson - Enhancing Plastic Surgery Outcome Evaluation with Artificial Intelligence: Analyzing Facial Changes after Plastic and Reconstructive Procedures.**

To date, there are limited objective tools available for evaluating the success of Facial Plastic and Reconstructive surgery Procedures. It will be presented how to leverage AI, specifically convolutional neural network algorithms to assess facial enhancements and patient satisfaction following facial plastic and reconstructive surgery procedures.

**IV lesson - Augmented reality-assisted perforator flap harvesting.**

An AR visualization technique for tracking perforator vessels will be introduced, enabling clinicians to real-time overlay a virtual 3D model, reconstructed from CT angiography, onto the

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patient using motion tracking. This model can expedite and enhance the safety of harvesting perforator flaps.

### **V lesson - Mixed Reality and 3D Printed Models for Planning and Execution**

**of Face Transplantation.** Facial transplantation represents an intricate form of craniofacial reconstruction that necessitates thorough planning, a deep understanding of the unique spatial aspects of each patient, and the ability to make time-critical decisions. The utilization of computer-assisted 3D modelling has significantly enhanced the efficiency and results of complex craniofacial reconstructions. It enables surgeons to engage in virtual surgical planning and generate 3D printed models. AR technology can further elevate the surgical planning process by enhancing visualization and providing the capability to manipulate virtual craniofacial models directly within the surgical field.

### **VI lesson - Augmented reality, AI and 3D Models in Facial Feminization Surgery, Facelifts, and maxillofacial surgery: relevant technologies.**

**VII lesson - Artificial Intelligence for breast surgery.** Use of AI for preoperative planning of breast plastic surgery procedures to enhance surgical precision and patient satisfaction.

**VIII lesson - Objective Assessment Scales and conclusions.** The development of objective evaluation scales for assessing the outcomes of plastic surgery procedures. The Rasch model, inter-rater reliability, and intra-rater reliability will be presented as methods for the validation of these scales.

**Conclusions** The convergence of AI, 3D Models, and AR is revolutionizing plastic surgery. ICTH students stand at the intersection of healthcare and technology, well-positioned to contribute to this exciting frontier. By harnessing these tools, they can drive innovation, enhance patient care, and shape the future of healthcare technology.

## Notes

Doctoral Students with noticeable experience on this module topics can participate as Tutors.

Participants to the Module (including those interested to the Tutorship positions) are requested to e-mail to prof. SIMONE LA PADULA the following: Student name, name of the PhD course and cycle, by **15 May, 2024.**

There will be a final assessment.

Info: **Prof. SIMONE LA PADULA** - tel. 081 7462512 – [simone.lapadula@unina.it](mailto:simone.lapadula@unina.it)