21. EXTRACORPOREAL BLOOD PURIFICATION[i]	
Level I	
Department of Health Sciences (DSS)	
Course coordinator	Gianluca Villa
Executive Committee	Gianluca Villa Zaccaria Ricci Stefano Romagnoli
Contact person for information regarding teaching organization, class schedule, course content	Maria Cristina Ruffa mariacristina.ruffa@polito.it
Practical-professional profile of the course and industry sector of reference	The course aims to provide the theoretical knowledge and practical skills essential for adequately managing extracorporeal blood purification therapies that may be necessary for treating critical patients. Specifically, the course aims to train all health care professionals who cooperate in managing the critical patient undergoing extracorporeal therapies, whether nephrology physicians or resuscitative anesthesiologists, nurses, perfusionists, biologists, or dialysis technicians. To this end, the training will be structured to integrate face-to-face teaching and practical activities. The theoretical lectures, conducted in e-learning mode, provide the main concepts regarding extracorporeal treatments to support organ function in intensive care. Particular attention is paid to the description of the basic principles underlying treatments to support renal function (dialysis, convection, absorption), the primary treatment modalities (e.g., CVVH, CVVHD, CVVHDF, etc.), and the rational use of the main hemodiafilters and cartridges currently available on the market. Similarly, extracorporeal treatments to support the liver (single pass albumin dialysis (SPAD), mars, Prometheus, bioartificial organs) and lung function (both for decapneization and oxygenation) are described. This theoretical description is complemented by blood purification treatments designed to eliminate mediators of inflammation and bacterial toxins in the septic patient and, more generally, immunomodulation treatments of the critical patient under conditions of “cytokine cascade.” The main technical and usage characteristics of adsorbent cartridges frequently used during clinical practice, such as, for example, “polymyxin b-based” ones, as well as of hemodiafilters specifically designed for cytokine removal (such as “high cut-off membranes”) are described. The lectures enrich all topics with practical laboratory simulations and example experiments demonstrating the purifying effectiveness of individual methods. The ability to simulate different treatments in the laboratory allows individual learners to observe and manage in practical terms different treatment scenarios, including critical ones, independently and safely. Small sets of in-vitro experimentation and illustration of the theoretical and practical basis of in-vitro/ex-vivo/in-vivo experimentation concerning blood purification methods are also offered in the laboratory At the end of the course, learners will have acquired the knowledge necessary for the proper management of the critical patient undergoing extracorporeal treatment and, in particular, will be able to choose the timing of treatment initiation, the devices to be used with the specific machines, anticoagulation regimens, and how to clinically monitor the patient during and at the end of treatment. Thus, the practical skills necessary for extracorporeal circuit assembly and priming, attachment, treatment, blood return, and patient disconnection will be achieved. Furthermore, topics more specifically related to the construction of membranes

	and the study of the fluid dynamics in force in the hemodiafilter will be explored in depth.
Access prerequisites	Bachelor's Degree obtained under the system as per Ministerial Decree No. 270/2004 (or Ministerial Decree No. 509/1999, declared equivalent with D.I. July 9, 2009) in the following class: - L/SNT1 Class of degrees in nursing and midwifery health professions or equivalent degrees under Law No. 1/2002, provided they are combined with a high school diploma; or - Bachelor's Degree obtained under the system as per Ministerial Decree No. 270/2004 (or Ministerial Decree No. 509/1999, declared equivalent pursuant to D.I. July 9, 2009) in Cardiovascular Physiopathology and Cardiovascular Perfusion Techniques-L/SNT3 Class of degrees in technical health professions or equivalent degrees pursuant to Law No. 1/2002, provided they are combined with a high school diploma Master's Degree obtained under the system as per Ministerial Decree No. 270/2004 (or specialist Degree under Ministerial Decree No. 509/1999 declared equivalent under D.I. July 9, 2009) in the class LM-41 Medicine and Surgery; LM-21 Biomedic Engineering. Degree awarded according to a system prior to Ministerial Decree No. 509/1999 in: Medicine and surgery Bachelor's degree obtained according to a system prior to the Ministerial Decree. n. 509/1999 of strictly similar content, deemed suitable by the Organizing Committee or by a Commission specifically appointed by it.
How the admission procedure takes place	Joint selection based on qualifications and selective test, aimed at verifying skills and interests regarding blood purification therapies in critically ill patients. The test will consist of an electronic interview via the university teleconferencing platform. The first four classified in the master's selection ranking will benefit from the payment of the registration fee through funds made available by the organizing committee. Such registrations are to be considered already covered by external funding granted to the master by private companies interested in supporting teaching. These registrations are therefore included in the calculation of the minimum registrations necessary for the activation of the master's degree. The selection of candidates for enrollment in the Master consists of: 1) the evaluation of the online applications and curricula vitae presented 2) an interview to be carried out electronically (Google meet, link...). The criteria considered by the Organizing Committee at the time of selection will include: - Previous scientific experience gained in the field of blood purification therapies or fluid dynamics or biomaterials. - Previous clinical or technological experience gained in the field of blood purification therapies or fluid dynamics or biomaterials. - Organisational/managerial aptitude for the local dissemination (in the relevant work centre) of the knowledge acquired during the master's degree.
Duration	12 months

Teaching methods	Mixed teaching mode consisting of: 1) theoretical lectures delivered entirely in e-learning mode, making use of the University's Moodle platform, 2) hands-on teaching activities conducted in the Laboratory of the Institute of Anesthesiology.
Language of instruction	Italian
Verification of knowledge of the language in which the course is delivered	The course will be held in Italian.
Attendance requirements	90%
Location of the course	The practical simulations are held in person at the Laboratory of the Institute of Anesthesiology, CUBO 2 (2nd floor - room no. 2/038) Viale Pieraccini, 6 - 50139 Florence - and the Simulation Center of the Institute of Anesthesiology, Nuovo Ingresso Careggi (N.I.C.), Largo Brambilla, 3 - 50139 Florence.
Foreseen lecture schedule	The practical simulations will be held bimonthly and will take place during working days. The assessment of educational activities consists of examinations with a grade expressed in thirtieths and possible mention of honors or with a pass/fail grade in some cases.
Examinations procedures and schedule	The assessment of educational activities consists of written tests on Moodle with a grade expressed in thirtieths to be taken during the academic year on dates chosen by the student.
Final examination	The final examination consists of the presentation of a paper.

Available places and enrolment fees	
Full-fee students	
Minimum number	5
Maximum Number	50
Enrolment fee	€2,000
Single Modules	
None planned	

Description of the activities and training objectives of the internship	The students also carry out a period of clinical and technical training, carried out through participation in practical simulations and aimed at understanding and becoming autonomous in the priming, prescription, delivery and discharge procedures of the various extracorporeal treatments, at the following host entities affiliated with the University Florentine: - the Institute of Anesthesiology, Surgical Clinical Pavilion (8b) AOUC, Largo Brambilla, 3 – 50139 Florence.

[i] This document is a translation of the form A.1 relating to the characteristics of the course attached to the Decree of the Deputynumber 848 (record 153310) of 2th of July 2024, drafted in Italian and issued on the Master | Didattica | Università degli Studi di Firenze | UniFI and which therefore constitutes the only official document. This English translation cannot be used for legal purposes and has the sole purpose of supplying information in English on the content of the public notice.