UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Computer Modelling and Artificial Kidney

2122-4-H4102D031-H4102D122M

Aims

The aim of the course is to learn theoretical models for the study of renal function and the techniques used for the replacement of renal function.

Contents

Theoretical modeling of transport phenomena in biological and artificial systems. Principles of operation of dialysis treatments. Practical demonstration of hemodialysis treatment.

Detailed program

Mass balances for the calculation of the determinants of glomerular filtration. Mathematical model for the simulation of the permselectivity of the glomerular membrane. Description of the extracorporeal circuit for hemodialysis, peristaltic pumps, dialysis lines, sensors and liquid dialysis circuit, dialyzers. Types and monitoring of vascular accesses for hemodialysis. Mathematical models for solute transport across the dialyzer membrane. Principles of operation of peritoneal dialysis. Visit of the hemodialysis session. Demonstration of data collection systems during the dialysis session. Hints on the use of robotics in the urological field. Theoretical principles and practical applications.

Prerequisites

Basic knowledge of mathematics and physics. Knowledge related to renal physiology, physics and biochemistry. Fundamentals of renal pathology and urological diseases.

Teaching form

Lectures, demonstrations using software and solutions of simple quantitative problems. Practical demonstrations in the departments of Dialysis and Urology.

Textbook and teaching resource

Course slides sent to students using the e-learning platform.

Semester

Second semester

Assessment method

Oral interview during practical demonstrations to verify the learning of theoretical notions in the field.

Office hours

Monday from 4 to 6 pm (Dalmine office C405 or via remote connection)