Microfluidic Systems

1. Conservation laws based on continuum mechanics (continuity, momentum and energy equations)
2. Slip and no slip boundary conditions, Knudsen number. Gas flow in microchannels
3. Transport phenomena in microfluidic systems (diffusion, dispersion, mixing, evaporation, two-phase flow)
4. Operation principles of mechanical and non mechanical micropumps. Simulation methods
5. Microsensors measuring pressure, fluid velocity and wall shear stress
6. Flow control using MEMS (flow control, reduction of aerodynamic drag, lift augmentation, transition to turbulence)
7. Microtechnology for the fabrication of microfluidic systems on Si, glass and polymeric substrates
8. Technology for sealing of microfluidic devices and fluidic interconnects
9. Applications in (bio)chemical analysis (separation methods and examples of micro-total analysis systems)