NANO-BIOENGINEERING FOR MEDICINE

Week 1

Wednesday, May 2nd 2018

1.   INTRO AND FUNDAMENTALS

- 9:00 –   Welcome   - Jorge Pedrosa (Director of ICVS)
- 9:15 –   Nanotechnology and Health (Paulo Freitas – INL)
- 10:00 –   Coffee Break
- 10:30 –   Colloids, amphiphiles and polymers – from biomaterials in life to engineered nanocarrier assemblies (Bruno Silva – INL)
- 11:20 –   Nano-bio-interfaces: Surfaces and colloids in biology and medicine (Dmitri Petrovykh – INL)
- 12:10 –   Lunch Break

2.   DIAGNOSTICS

- 13:30 –   Introduction to Biomarkers: paradigmatic examples from oncology (Bruno Costa, ICVS)
- 14:20 –   Biomarkers' impact in personalised medicine (Marina Brito, INL)
- 15:05 –   Coffee Break
- 15:30 –   Genetically encoded sensors for high-throughput screening (Pedro Ferreira, ICVS)
- 16:20 –   Host Biomarkers: from susceptibility to infection and disease, (Ricardo Silvestre, ICVS)
- 17:10 –   Peripheral biomarkers in neurological diseases (João Cerqueira/Patrícia Maciel, ICVS)

Thursday, May 3rd 2018

2.   DIAGNOSTICS (cont.)

- 9:00 –   Biohybrid lung: from the bench to the bedside (Sotirios Korossis, Hannover University, Germany)
- 9:50 –   Organ-on-chip models of human physiopathological processes (David Caballero, 3B's)
- 10:35 –   Coffee Break
- 11:00 –   Microfluidics 101 – An introduction to fluid mechanics in miniaturized devices (Sara Abalde, INL)
- 11:50 –   Biosensors: The new wave for health diagnostics (Raquel Queirós, INL)
- 12:35 –   Lunch Break
- 14:00 –   Seeking particles large and small in cancer patient blood: utilizing microfluidics to isolate CTCs and exosomes (Shannon Stott, Massachusetts General Hospital, USA)
- 14:50 –   Lab-on-a-chip devices for medical applications (Paulo Freitas, INL)
- 15:40 –   Coffee Break
- 16:10 –   Microfluidics for liquid biopsy (Lorena Diéguez, INL)
- 17:00 –   Engineering solutions for personalized health care (Pedro Morais / Sandro Queirós, ICVS)

Friday, May 4th 2018

3.   THERAPEUTICS AND THERANOSTICS

  9:00 –   Lipid-Nanoparticles for Nucleic Acid Delivery – Structure & Mechanisms (Joachim Rädler, LMU Munich)

  9:50 –   Targeted and Smart Nano Drug Delivery Systems (Oscar Silvestre, INL)

  10:20 –   Coffee Break

  10:50 –   Encapsulation of bioactives (Lorenzo Pastrana, INL)

  11:35 –   Biomimetic ECM-like hydrogels for CNS regenerative medicine (António Salgado, ICVS)

  12:15 –   Lunch Break

  14:00 –   Next generation of therapeutic biomaterials for tissue engineering and regenerative medicine (Helena Azevedo, Queen Mary University of London)

  14:55 –   Transdermal delivery (Liliana Pires, INL)

  15:25 –   Coffee Break

  16:00 –   Magnetic nanoparticles for theranostics (Manuel Bañobre, INL)

  16:50 -   Brain Machine Interface in Rehabilitation and Regenerative Medicine (Miguel Pais-Vieira, ICVS)

  17:20 -   Nanopatterned Membranes and Stem Cells as Tools for Tendon/Ligament Regeneration (Nuno Sevivas, ICVS)

Saturday, May 5th 2018

4.   CHARACTERIZATION METHODS

  9:00 –   Seeing Small: Understanding Structures by Transmission Electron Microscopy (Paulo Ferreira, INL)

  9:50 –   Biophotonics: deep tissue imaging, super-resolution microscopy (Jana Nieder, INL)

  10:35 –   Coffee Break

  11:00 –   New imaging techniques for diagnostic in injury and disease (Paulo Marques / Ricardo Magalhães, ICVS)

  11:50 –   Near-Infrared Fluorescence Imaging Using Indocyanine green for detection of malignant lesions – Hélder Ferreira (University of Porto)

  12:35 –   Closing Remarks - Lars Montelius (Director of INL)

  12:45 –   Barbeque at INL

Week 2, May 7th – 11th (optional – hands-on mini-projects)

A longer version of the course (two additional weeks) is available for interested students. During the second week of this option, students will form groups and choose one of four hands-on mini-projects, in the areas of (i) drug delivery systems; (ii) biomicrofluidics and (iii) biomimetic systems for diagnostic research.

Week 3, May 14th – 18th (optional)

The final week of the course is devoted to self-study for the final exam, and elaboration of the report and presentation of the results of the mini-project. Students from outside of the University of Minho can choose to perform both the presentation and exam remotely.