| Module | Courses | Course description |
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| **Introduction to nanotechnology, nanomaterials, and nanomedicine**<br>The module will focus on device physics and operation principle at the nanoscale, as well as principles of nanostructure production and characterization.<br>**30 hours** | **Introduction in nanotechnology, nanoelectronics and nanomedicine**<br>(Acad. I. Tiginyanu)<br>6 hrs | 1. Physics on the nanoscale.<br>2. Nanotechnologies as tools for nanofabrication.<br>3. Typical nanostructures and their networks.<br>4. Functionalities of various nanostructures for use in nanoelectronics and nanomedicine. |
| | **Introduction to nanotechnology and nanomaterials**<br>(Dr. E. Monaico)<br>8 hrs | 1. Nanomaterials: Synthesis and characterization.<br>2. Nanomaterials with various morphologies. |
| | **Introduction to Biomedical Engineering**<br>(prof. V.Sontea)<br>6 hrs | 1. Medical technologies<br>2. Medical devices<br>3. Management of medical technologies |
| | **Online courses from the University of Bristol**<br>10 hrs | 1. How materials assemble. Healthcare product based on dynamic self-assembly at the molecular level.<br>2. Optical trapping.<br>3. Chemical Vapour Deposition.<br>4. Focused Ion Beams.<br>5. Advanced forms of carbon. |
| **Micro- and Nano- electromechanical systems, microfluidic lab-on-a-chip and their integration in product design**<br>The module will provide insights on the principles of operation, physical structure, methods of fabrication and properties of a range of micro and nano electromechanical, microfluidic, and lab-on-a-chip systems with focus on their biomedical applications.<br>**30 hours** | **Electrochemistry for nanofabrication**<br>(Dr. E. Monaico)<br>6 hrs | 1. Electrochemistry: electrolytes, electrochemical cells and potentiostats.<br>2. Dielectric and semiconductor nanotemplates, type of pores.<br>3. Material nanostructuring by design, in-plane approach.<br>4. Pulsed electrochemical deposition for low dimensional materials fabrication. |
| | **Micro- and Nano- electromechanical systems**<br>(Prof. V. Ursachi)<br>16 hrs | 1. Inter-relations between nano-opto-electronics and micro-nano-electromechanics. Basic notions and physical concepts.<br>2. Technological tools for Microelectromechanical (MEMS) and Nanoelectromechanical (NEMS) system fabrication.<br>3. Microscopic and other tools for characterization of nano-opto-electronic and nanoelectromechanical materials and systems.<br>4. Applications areas of MEMS and NEMS.<br>5. MEMS based on silicon.<br>6. Applications based on GaN, diamond and related materials.<br>7. Biomedical MEMS applications. |

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| | **Microfluidics and micromotors**<br>(Dr. M. Enachi)<br>8 hrs | 1. Principles of Microfluidics.<br>2. Microfluidics in biomedical research<br>3. Introduction onto Lab-on-a Chip technology.<br>4. Micro-propulsion and self-propelled micro-engines.<br>5. Micromotors and hybrid micromotors: the new generation of drug carriers.<br>6. Micropumps and microvalves for precise control and manipulation of small fluid volumes.<br>7. Microsystems for single-cell analysis. |
| **Anatomy and physiology**<br>The module will focus on the structure and function of the major systems of human body, physiology of tumorigenesis and vasculature.<br>**24 hours** | **Anatomy and physiology**<br>(Prof. V. Vovc)<br>24 hrs | 1. General notions about structure and function of human organism. Homeostasis.<br>2. Neurons, synapses, nervous centers and nervous system.<br>3. Endocrine systems and its role in organism.<br>4. Functional anatomy of the cardiovascular system. Hemodynamics.<br>5. Structure and function of digestive, respiratory and excretory systems.<br>6. Physiology of blood, lymph and immune systems.<br>7. Cancer biology fundamentals and pathophysiology of tumorigenesis. |
| **Biomaterials biocompatibility**<br>The module will give a general overview on biocompatibility and biomaterials synthesis, characterisation, mechanical testing, surface modification. The clinical relevance of biocompatible materials will be discussed.<br>**40 hours** | **Biomaterials, Biocompatibility and Bioengineering**<br>(Prof. V. Nacu)<br>40 hrs | 1. Regenerative Medicine - concept, content, tasks. Regenerative medicine domains. Legal and ethical aspects. National and International laws. Bioengineering, concepts, methodologies and ethical challenges, nanomedicine with focus on materials, systems, chips, devices, robots.<br>2. The stem cell types and cells characteristics. The methods for obtaining, preservation and storage of stem cells. Practical skills for cells handling and analysis by specific instrumentation.<br>3. Cellular therapy, types, effectiveness. Perspectives of the cellular therapy. Standard protocols for tissue engineered components, including blood vessels, bone, cartilage, pancreas, liver, skin, etc.<br>4. Gene therapy, types, purposes. Benefits and potential risks of |

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| | | genetic therapy.<br>5. Tissue engineering, components of tissue engineering. Tissue engineered tissues and organs.<br>6. Natural and synthetic Biomaterials, types, characteristics, advantages and disadvantages in use for manufacture of different types of tissues. Biocompatibility. 3D scafolds. Protein adsorption, immune response, and sterilization.<br>7. Polymer synthesis, characterization, mechanical testing, surface modification and biocompatibility issues, e. g. Interaction of nanostructured materials with living organisms from the point of view of biotoxicity and mutation.<br>8. Tissue engineering in clinical practice.<br>9. 3D printing in tissue engineering, perspectives in restoration and repair of tissue defects.<br>10. Future of tissue engineering, bioreactors, bioprinters, gene engineering. |
| **Nanotechnologies and nanomaterials at the nano-biointerface**<br>This module will be focussed on practical applications of nanomaterials in medical field such as: detection and diagnostics, drug delivery systems and therapeutic approaches. Advances of nanotechnology in regenerative medicine and cancer detection and therapy will be discussed.<br>**40 hours** | **Advances in Nano-Oncology using Genetcis**<br>(Prof. G. Curocichin)<br>10 hrs | 1. Advances in Nano-Oncology with focus on prevention, screening and early detection.<br>2. Theranostic nanoparticles, which combine both therapeutic and diagnostic capabilities in one dose.<br>3. Oncology related nanoscaled imaging, including fluorophores and quantum dots labeling and functionalization.<br>4. Image analysis, imaging facilitating surgical approaches.<br>5. Nanotechnology for cancer therapy. |
| | **Nanotechnology and Nanomaterials for tissue engineering and drug delivery**<br>(Dr. T. Braniste)<br>20 hrs | 1. Nanotechnology for Biomedical Applications.<br>2. Nano-bio interactions and nano-bio interfaces.<br>3. Nanomaterials for Regenerative Medicine.<br>4. Smart nano coatings for improving biocompatibility in implantable materials.<br>5. NanoPharmaceuticals and Drug Delivery Nanotechnology. |

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| | Nanotechnology for Detection, Diagnostics, Therapeutics and Monitoring<br>(Dr. I. Pocaznoi)<br>10 hrs | 1. Diagnostic techniques using nanoparticles / nanotubes to detect cancer cells in the blood stream under laboratory conditions.<br>2. Treatment techniques in development involving nanorobots programmed for cellular repair.<br>3. Antibacterial and wound treatments, using gold particles and irradiation.<br>4. Nano-matrices for advanced diagnosis and therapy, invasive therapy nanotechnologies.<br>5. New aspects of the use of imaging based on nanotechnology.<br>6. Advanced technologies of nano-bio-sensors, implantable nanosensors, |
| **Bioinstrumentation**<br>The goal of bioinstrumentation module is to initiate students into principles of instrumentation and measurements used in medical analysis.<br>**24 hours** | Bioinstrumentation 1<br>(PhD V. Cobzac)<br>12 hrs | 1. Principles of instrumentation and measurements used in blood analysis.<br>2. Antibody based tests techniques Part I: Introduction. Polyclonal and monoclonal antibodies. ELISA.<br>3. Antibody based tests techniques Part II Part II: Western Blotting. Immunofluorescence and Immunohistochemistry. |
| | Bioinstrumentation 2<br>(PhD O. Ignatov)<br>12 hrs | 1. Bioinstrumentation. Physical and chemical biosensors.<br>2. Types of biomedical instruments.<br>3. Bioinstrumentation in Physiotherapy. |