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

Module	Courses	Course description
	Microfluidics and micromotors (Dr. M. Enachi) 8 hrs	1. Principles of Microfluidics. 2. Microfluidics in biomedical research 3. Introduction onto Lab-on-a Chip technology. 4. Micro-propulsion and self-propelled micro-engines. 5. Micromotors and hybrid micromotors: the new generation of drug carriers. 6. Micropumps and microvalves for precise control and manipulation of small fluid volumes. 7. Microsystems for single-cell analysis.
Anatomy and physiology The module will focus on the structure and function of the major systems of human body, physiology of tumorigenesis and vasculature. **24 hours**	**Anatomy and physiology** (Prof. V. Vovc) 24 hrs	1. General notions about structure and function of human organism. Homeostasis. 2. Neurons, synapses, nervous centers and nervous system. 3. Endocrine systems and its role in organism. 4. Functional anatomy of the cardiovascular system. Hemodynamics. 5. Structure and function of digestive, respiratory and excretory systems. 6. Physiology of blood, lymph and immune systems. 7. Cancer biology fundamentals and pathophysiology of tumorigenesis.
Biomaterials biocompatibility 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. **40 hours**	**Biomaterials, Biocompatibility and Bioengineering** (Prof. V. Nacu) 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. 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. 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. 4. Gene therapy, types, purposes. Benefits and potential risks of

Module	Courses	Course description
		genetic therapy. 5. Tissue engineering, components of tissue engineering. Tissue engineered tissues and organs. 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. 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. 8. Tissue engineering in clinical practice. 9. 3D printing in tissue engineering, perspectives in restoration and repair of tissue defects. 10. Future of tissue engineering, bioreactors, bioprinters, gene engineering.
Nanotechnologies and nanomaterials at the nano-biointerface 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. **40 hours**	**Advances in Nano-Oncology using Genetcis** (Prof. G. Curocichin) 10 hrs	1. Advances in Nano-Oncology with focus on prevention, screening and early detection. 2. Theranostic nanoparticles, which combine both therapeutic and diagnostic capabilities in one dose. 3. Oncology related nanoscaled imaging, including fluorophores and quantum dots labeling and functionalization. 4. Image analysis, imaging facilitating surgical approaches. 5. Nanotechnology for cancer therapy.
	Nanotechnology and Nanomaterials for tissue engineering and drug delivery (Dr. T. Braniste) 20 hrs	1. Nanotechnology for Biomedical Applications. 2. Nano-bio interactions and nano-bio interfaces. 3. Nanomaterials for Regenerative Medicine. 4. Smart nano coatings for improving biocompatibility in implantable materials. 5. NanoPharmaceuticals and Drug Delivery Nanotechnology.

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