UNIVERSITY OF NOVI SAD
FACULTY OF MEDICINE

Study program: Doctoral Academic Studies in Biomedical Sciences

Name of the subject: CONTEMPORARY MATERIALS AND COMPONENTS IN DIAGNOSTIC AND THERAPEUTIC SYSTEMS

Teacher(s): Goran Stojanović, Bojan B. Petrovic

Status of the subject: elective

Number of ЕСПБ points: 20

Condition: -

Goal of the subject

To understand properties of commonly used materials in biomedicine.
To apply these materials in modern medical devices in biomedicine in general.
To independently investigate properties of new materials and to include them in research in the field.
Training students to acquire knowledge and skills by applying the principles of PBL technique

Outcome of the subject

Ability to understand the properties of nano and micro structured materials commonly used in medicine. Ability to understand the application and role of bioceramics, artificial materials, composites, 3D printing in medicine and dental medicine. Ability to investigate structural, mechanical, electronic, optical personalities of these materials. Ability to include these materials and electronic components based on them in own research and medical practice.

Content of the subject

Theoretical lectures

1. Bioceramics (barium titanate for making ultrasonic probes, ferrites elimination of electromagnetic interference and noise in medical devices, 2. Superconducting magnets for magnetic resonance imaging).3. Biomedical composites - biopolymers (Teflon as dielectric material for medical probes) 4. Polymeric wireless implant for blood sugar measurement). 5. Biomaterials for cardiovascular administration (Ag / AgCl for electrodes).6. Shape memory alloys (nitinol) for application in dental medicine. 7. Biomaterials for orthopedic applications.8. Biomaterials for tissue reparation. 9. Application of sensors for measuring the force of proper gait in orthopedics and rehabilitation. 10The use of OLED in pain therapy. 11.Application of microfluidic chips for drug delivery. 12. Application of magnetic nanoparticles for thermoampuation of cancer tissue. 13. Application of microwave ablation to destroy liver metastases. 14. The use of edible electronics in the oral cavity and gastrointestinal tract theranostics. 15. 3D printing of components of diagnostic and therapeutic systems

Practical lectures

Designing projects based on PBL system principles.Design and manufacturing of microfluidic chips. Microfluidic chip testing. Determination of mechanical properties of materials using nanoindentation method. Determination of electrical properties of edible sensors.

Recommended literature

1. Stojanović G. Nanoelectronics and application of nanomaterials. FTN pubishing, no 338, 2012
2. Grumezescu A. Nanobiomaterials in Hard Tissue Engineering. Applications of Nanobiomaterials. Elsevier 2016.

Number of active classes	**Theory:** 60	**Practice:** 45

Methods of delivering lectures

Lectures. Experimental exercises. Consultations. Practical student projects. Opportunity to engage students in ongoing research projects in the field. Writing scientific papers.

Evaluation of knowledge (maximum number of points 100)

lecture test: 30
experimental exercise test: 20
final examination/project: 50