



Study program: Doctoral Academic Studies in Biomedical Sciences		
Name of the subject: DEVELOPMENT OF IMPLANTS AND PROSTHETIC DEVICES		
Teacher(s): Slobodan Tabaković, Igor M. Budak		
Status of the subject: elective		
Number of ECTS points: 20		
Condition: -		
Goal of the subject Acquisition of theoretical and practical knowledges in the field of development of implants and prosthetic devices in various fields of medicine.		
Outcome of the subject Knowledges in the field of designing of implants and prosthetic devices. Students gain knowledge of methods of engineering product development used in these fields. This includes: basic concepts of product development in biomedical engineering, methods of gathering and processing of information's that form the basis (input) in process of design, design methods and familiarization with the basics of implant and prosthetic devices. In addition, an educational outcome includes knowledges of the features and capabilities of modern software systems for product development in biomedical engineering.		
Content of the subject <i>Theoretical lectures</i> Methods of 3D digitization of anatomical structures. Structure and processing of diagnostic images and other 3D digitization results. Basic concepts, metadata, segmentation, creation of geometric shapes, limitations and possibilities of application. Basic concepts in implantology. Types of implants and design methods in different fields of medicine. The role and importance of guides and accessories for implant placement and methods of their design. Specific aspects of implant design dictated by the method of manufacture. Preparation of digital plans for implant placement. Virtual planning of implantation. Geometric analyzes of implants embedded in anatomical structures. Basic concepts in prosthetics. Types, structure and characteristics of prosthetic devices. Basic geometric and functional characteristics of prosthesis. Methods of product design. Structure of software systems for product development and design. Development of universal and custom made prosthesis. Computer analysis of behavior of prosthetic aids in exploitation using CAE software systems and virtual reality. <i>Practical lectures</i> Students are trained to solve specific problems in practice and scientific research through specific examples related to the: application of 3D digitization system, processing of diagnostic images (RTG, MSCT, CBCT, MRI), defining of input information, designing and analyzing of implants and prosthetic devices.		
Recommended literature 1. Richard Bibb, Dominic Eggbeer, Abby Paterson: Medical Modelling: The Application of Advanced Design and Rapid Prototyping Techniques in Medicine, 2015, 2nd Edition, Elsevier, ISBN-13: 978-1782423003. 2. Selected papers from scientific journals and conferences		
Number of active classes	Theory: 60	Practice: 45
Methods of delivering lectures Lectures, individual research work, consultations. The lectures cover the theoretical part of the material, followed by characteristic examples for easier understanding of the material. Through student research work, the student, while studying the scientific and other literature, independently extends the material from the lectures. In addition to working with the teacher, the student is trained to write scientific papers independently.		
Evaluation of knowledge (maximum number of points 100) preparation and presentation of the project: 50 oral exam: 50		