**Model of the DESCRIPTION of Curricula/Module**

|  |  |
| --- | --- |
| **Short Name of the University/Country code Date (Month / Year)** | **CUT May 2018** |
| **TITLE OF THE MODULE** | **Code** |
| **Biomaterials II** |  |

|  |  |
| --- | --- |
| **Teacher(s)** | **Department** |
| **Coordinating:** Aneta Liber-Kneć, PhD  **Others:** Sylwia Łagan, PhD | Applied Mechanics |

|  |  |  |
| --- | --- | --- |
| **Study cycle** | **Level of the module** | **Type of the module** |
| Bachelor/Masters | 5th semester | Elective |

|  |  |  |
| --- | --- | --- |
| **Form of delivery** | **Duration** | **Langage(s)** |
| Laboratory exercises | 15 weeks | English |

|  |  |
| --- | --- |
| **Prerequisites** | |
| **Prerequisites:**  Knowledge: metallic, polymer and ceramic materials, methods of physic-mechanical properties determination.  Skills: analysis of test results.  Competences: team work in laboratory. | **Co-requisites (if necessary):**  - |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ECTS  (Credits of the module)** | **Total student workload hours** | | **Contact hours** | | **Individual work hours** |
| 6 | 90 | | 30 | | 60 |
| **Aim of the module (course unit): competences foreseen by the study programmes** | | | | | |
| Students should be able to:   * Verify biomaterials in terms of their properties and selection for use; * Analyze and compare physical and mechanical properties of different types of biomaterials; * Suggest the appropriate factors influencing on physic-mechanical properties of biomaterials and interaction between material and human body; * Plan and conduct basic experimental study in the field of application of biomaterials in biomedical devices; * Formulate terms of biocompatibility and biofunctionality from the point of view of the safe use of material in the human body; | | | | | |
| **Learning outcomes of module (course unit)** | | **Teaching/learning methods** | | **Assessment methods** | |
| Knowledge:  Specialized knowledge on physical and mechanical properties of biomaterials, methods of testing biomaterials properties, knowledge on basic methods of biomaterials processing, procedures of placing medical device on the market | | Work with the handbooks and laboratory instructions | | Knowledge test | |
| Skills:  Ability to plan and conduct basic physical and mechanical tests dedicated for biomaterials. Ability to analyze test results for the terms of biocompatibility formulation. Ability to use some laboratory equipment. | | Laboratory practice at the university | | Performance during laboratory practice, preparation of the report on each exercise | |
| Competences:  Ability to choose and adjust the biomaterial to match its properties to tissues, design rules of experiment, exchange knowledge, working in group | | Laboratory practice at the university, project, consultation | | Individual projects, presentation | |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Themes** | **Contact work hours** | | | | | | | **Time and tasks for individual work** | |
| Lectures | Consultations | Seminars | Practical work | Laboratory work | Placements | **Total contact work** | **Individual work** | **Tasks** |
| 1. Preparation and testing mechanical properties of composite materials |  |  |  |  | 4 |  | **4** | **7** | Study of methods of composite materials processing and understanding the influence of structure and volume fraction of components on composite properties |
| 2. Methods of surface testing – determination of contact angle and free surface energy of biomaterials |  |  |  |  | 3 |  | **3** | **6** | Understanding the role of biomaterials surface properties on interactions between biomaterial and living organism |
| 3. Production of scaffold and characteristic of its structure |  |  |  |  | 3 |  | **3** | **6** | Understanding the idea of tissue engineering and the role of scaffold, study properties of scaffold |
| 4. Testing mechanical properties of surgical sutures |  |  |  |  | 3 |  | **3** | **6** | Study on standards for thread testing and requirements |
| 5. Production of casts for the needs of medicine |  |  |  |  | 4 |  | **4** | **6** | Study on procedure of making casts and application of silicone casts in medicine |
| 6. Electrolytic polishing of metallic materials |  |  |  |  | 3 |  | **3** | **5** | Study on methods on surface treatment of metallic implants, understanding the influence of parameters of process on surface quality |
| 7. Testing properties of biomaterials use in dentistry |  |  |  |  | 3 |  | **3** | **6** | Study on classification of biomaterial used In dentistry, its properties and methods of testing |
| 8. Group project on adaptation of the biomaterial and methods of its production for use as a medical device. |  | 7 |  |  |  |  | **7** | **18** | Study of theoretical material, preparing the project and its presentation |
| **Total** |  | **7** |  |  | **23** |  | **30** | **60** |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Assessment strategy** | **Weight in %** | **Deadlines** | **Assessment criteria** |
| Knowledge verifying with a multiple choice test | 40 | 15th week | Test |
| Assessment of work during laboratoryexercise | 40 | 15th week | Reports on each laboratory exercise |
| Final Project | 20 | 16th week | Group projects |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author** | **Year of issue** | **Title** | **No of periodical or volume** | **Place of printing. Printing house or internet link** |
| **Compulsory literature** | | | | |
| Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemons | 2013 | Biomaterials Science, Third Edition: An Introduction to Materials in Medicine |  | Elsevier Inc.  ISBN: 978-0-12-374626-9 |
| Joon Park, R. S. Lakes | 2007 | Biomaterials: An Introduction |  | Springer  ISBN: 978-0387378794 |
| Joon B. Park, Joseph D. Bronzino. | 2002 | Biomaterials: Principles and Applications |  | CRC Press  ISBN: 9780849314919 |
| Paul K. Chu, Xuanyong Liu | 2008 | Biomaterials Fabrication and Processing Handbook |  | CRC Press  ISBN 9780849379734 |
| Shayne Cox Gad, Samantha Gad-McDonald | 2016 | Biomaterials, Medical Devices, and Combination Products: Biocompatibility Testing and Safety Assessment |  | CRC Press  ISBN 9781482248371 |
| **Additional literature** | | | | |
|  |  |  |  |  |