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

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| **Short Name of the University/Country codeDate (Month / Year)**  | **CUT/P04May 2018** |
| **TITLE OF THE MODULE** | **Code**  |
| **Bio-ceramics** |  |

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| **Teacher(s)** | **Department** |
| **Coordinating:** Aneta Szewczyk-Nykiel, PhD**Others:** Janusz Mikuła, Prof.Kinga Korniejenko, PhD | Institute of Materials Engineering |

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

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| **Form of delivery** | **Duration**  | **Langage(s)** |
| lectures, laboratory, seminary | 15 weeks | English |

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| **Prerequisites** |
| **Prerequisites:** Knowledge: * Basic technical knowledge: mathematics, phisics and chemistry.
* Basic knowledge about material sciences.

Skills: analysis, calculations, basic software for calculationsCompetences: none. | **Co-requisites (if necessary):** - |

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| **ECTS (Credits of the module)**  | **Total student workload hours** | **Contact hours** | **Individual work hours** |
| 6 | 150 | 30 | 120 |
| **Aim of the module (course unit): competences foreseen by the study programmes** |
| To enable the students to have a sound knowledge about the applications of ceramic materials in biological field;Compare the advantages and disadvantages of ceramic materials for some applications in medicine/ biotechnology;Choose the appropriate bioceramic for particular application. |
| **Learning outcomes of module (course unit)** | **Teaching/learning methods** | **Assessment methods** |
| Knowledge:* Knowlage of basic properties of ceramics, including biocompatibility and biofunctionality.
* Knowledge of basic methods of testing bioceramics material.
* Knowledge of various applications of ceramic materials in the medical field.
 | Lectures | Oral exam (presentation) |
| Skills: * Ability to analyze and compare physical and mechanical properties of different types of biomaterials, including bioceramics;
* Explain the basic advantages and disadvantages of ceramic materials in biomedicine.
* Skills connected with proper presentation of technical issues.
 | Workshops  | Reports |
| Competences:* Demonstrate innovation ideas in the field of materials for biomedicine, especally bioceramics and theirs applications.
* Translate into intelligible the basic ideas connected with bioceramics and and theirs applications in medicine.
* Select, after consideration, proper material based on bioceramisc for chosen biomedical applications.
 | Seminary | Project, presentation |

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| **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. Fundamentals of bio-ceramics | 2 |  |  |  |  |  | **2** | **8** | Study of theoretical material, case studies |
| 2. Ceramics as biomaterials.  | 4 |  |  |  | 2 |  | **6** | **12** | Study of theoretical material, case studies |
| 3. Biominerals and mineralised tissues.  | 2 |  |  |  |  |  | **2** | **6** | Study of theoretical material, case studies |
| 4. Biostable ceramics.  | 2 |  |  |  |  |  | **2** | **6** | Study of theoretical material, case studies |
| 5. Bioactive ceramics.  | 2 |  |  |  |  |  | **2** | **6** | Study of theoretical material, case studies |
| 6. Composities based on ceramic matrix. | 4 |  |  |  | 2 |  | **6** | **12** | Study of theoretical material, workshop |
| 7. Bioactive coatings. | 2 |  |  |  |  |  | **2** | **8** | Study of theoretical material, workshop |
| 8. Applications. | 2 |  | 6 |  |  |  | **8** | **62** | Study of theoretical material, preparing the project and its presentation |
| **Total** | **20** |  | **6** |  | **4** |  | **30** | **120** |  |

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| **Assessment strategy** | **Weight in %** | **Deadlines** | **Assessment criteria** |
| Knowledge verifying  | 30 | 15th week | Oral exam |
| Assessment of work during laboratory exercise | 30 | 15th week | Reports on each laboratory exercise, activity.  |
| Final Project- presentation | 40 | 15th week | Attendance, activity, oral presentation |

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| **Author** | **Year of issue** | **Title**  | **No of periodical or volume** | **Place of printing. Printing house or internet link** |
| **Compulsory literature** |
| LL Hench | 2013 | An Introduction to Bioceramics: Second Edition |  | World Scientific Publishing Company |
| I.V. Antoniac (ed.) | 2016 | Handbook of Bioceramics and Biocomposites |  | Springer |
| **Additional literature** |
| S.B.H. Farid | 2019 | Bioceramics: For Materials Science and Engineering |  | Woodhead Publishing Series in Biomaterials |
| M. Vallet‐Regí (ed.) | 2014 | Bio‐Ceramics with Clinical ApplicationsEditor(s):  |  | John Wiley & Sons, Ltd |
| T. Kokubo (ed.) | 2008 | Bioceramics and their Clinical Applications |  | Woodhead Publishing Series in Biomaterials |
| B.D. Ratner, A.S. Hoffman, F.J. Schoen, J.E. Lemons | 2013 | Biomaterials Science, Third Edition: An Introduction to Materials in Medicine |  | Elsevier Inc. |