COURSE DESCRIPTION CARD - SYLLABUS

Course name
Biomaterials and their manufacturing technologies [S1ETI2>BiTiW]

Course

Field of study
Education in Technology and Informatics

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

dr hab. inż. Andrzej Miklaszewski prof. PP
andrzej.miklaszewski@put.poznan.pl

Lecturers

Prerequisites

Basic knowladge from material science.

Course objective

To become familiar with the theoretical and practical aspects of the manufacture and control of parameters and functional characteristics of biomaterials. To learn the basic issues of technological quality assessment of sintered products, as well as the determination of their functional characteristics.

Course-related learning outcomes

Knowledge:
Student has basic knowledge of selected chemical matters necessary to understand basic technological processes
Student has basic knowledge of technical mechanics, strength of materials and general principles of engineering structures, as well as technologies for producing and processing engineering materials
Student has knowledge of current issues in materials engineering, functional materials and nanotechnology

Skills:
Student is able to work individually and in a team, manage their time and communicate using advanced information and communication techniques appropriate to carry out tasks typical of engineering activities
Studentis able to select materials with appropriate physicochemical and structural properties for engineering applications, select appropriate manufacturing technologies to design products, their structure and properties, recognizing social, economic, ecological and legal aspects
Student is able to plan, perform standard measurements, analyze, interpret and document test results, is able to identify and assess the importance of basic factors disrupting the measurement

Social competences:
Student is able to work on a given task independently and cooperate in a team, assuming various roles, demonstrates professionalism and responsibility for decisions made
Student acts in accordance with the principles of professional ethics and is responsible for the reliability of the results of their work

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: The knowledge acquired in the lecture is verified by two 45-minute colloquia implemented in the 6th and 7th lectures. Each colloquium consists of 10-20 questions (test and open type), variously scored. The threshold for passing: 50% of the points. The credit issues on the basis of which the questions are developed are presented at the lectures and discussed in detail during the lectures
Laboratories: the student prepares for laboratory classes according to the guidelines contained in the content of the laboratory instructions indicating the scope and sources. Knowledge is checked on an ongoing basis in each class in the form of oral or written answers to the questions posed, and evaluated on the basis of the reports of each laboratory exercise which is the basis for the course settlement. Laboratory exercise should be performed in accordance with the instructions. Each laboratory exercise requires a passing grade. At the end of the semester, after completing 6 mandatory exercises, there is the possibility of corrective credit for selected exercises.

Programme content

Lecture:
1) Biomaterials introduction and their division
2) Biomaterials key features and properties
3) Metalic based Biomaterials
4) Biomaterials and technologies of their production
5) Biomaterials in terms of utility
6) Methods for improving the performance and functional properties of biomaterials
Laboratory:
1) Powder metallurgy
2) Selected methods of consolidation and sintering
3) Evaluation of technological properties of produced sinters - density, porosity, phase composition
4) Study of the microstructure of manufactured sinters
5) Evaluation of functional properties of manufactured sinters
6) Measurements of corrosion resistance of biomaterials by potentiodynamic method

Course topics

Lecture: Biomaterials introduction and their division, Biomaterials key features and properties, Metalic based Biomaterials, Biomaterials and technologies of their production, Biomaterials in terms of utility, Methods for improving the performance and functional properties of biomaterials.
Laboratory: Powder metallurgy, Selected methods of consolidation and sintering, Evaluation of technological properties of produced sinters - density, porosity, phase composition, Study of the microstructure of manufactured sinters, Evaluation of functional properties of manufactured sinters, Measurements of corrosion resistance of biomaterials by potentiodynamic method.

Teaching methods

Lectures: multimedia presentation,

Laboratory exercises: microscopic observations; performance of tasks given by the instructor - practical exercises.

Bibliography

Basic:
"Biomateriały"Jan Marciniak, Wydawca: Wydawnictwo Politechniki Śląskiej, ISBN: 8373350314
"Biomateriały"Świeczko-Żurek Beata, Seria: Pomorska Biblioteka Cyfrowa,ISBN: 978-83-7348-272-2
"Tom 4. Biomateriały" redaktor serii : Maciej Nałęcz,redaktorzy tomu : S. Błażewicz, L. Stoch,ISBN 83-87674-58-

Additional:
"Bionanomateriały" Jakubowicz Jarosław, Jurczyk Mieczysław,Wydawnictwo PP, ISBN 978 -83-7143-373-3

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00