SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Biomaterials

Educational subject description sheet

Basic information

Field of study Course Offer for exchange students - second cycle studies, including uniform master studies (MA programmes) **Speciality** - **Organizational unit** Course Offer for exchange students **Study level** second cycle studies, including uniform master studies (MA programmes) **Study form** full-time studies **Education profile** General academic	**Didactic cycle** 2024/25 **Subject code** PWMPWM2S_D.B100000.06421.24 **Lecture languages** english **Mandatory** Elective subjects **Block** Basic subjects **Disciplines**

Coordinator	Marta Kutwin
Teacher	Marta Kutwin

Period	**Examination**	**Number of ECTS points**
Winter semester	Pass with grade **Activities and hours** Lecture: 15 Laboratory exercises: 24 Seminar exercises: 6	4

Goals

Code	Goal
C1	The course will focus on the biomaterials, biocompatibility of biomaterials, and biomaterials technology applied in clinical practice. Biomaterials course will also provide a solid basis in the principles in field of materials science, cell biology, cellular interactions with biomaterials, methods for biomaterials surface characterization, analysis of corrosion, biodegradation of implants by reference to case studies. Introduction to basic concepts of Biomaterials Science. Lecture: Manufacturing and properties of metals, ceramics, polymers, composites and nanocomposites. Lecture and laboratory practice Assessment of biocompatibility of biomaterials . Lecture and laboratory practice. Host Responses to Biomaterials. Lecture and laboratory practice.

Entry requirements

Cell biology, chemistry and physic.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	Students know basic biomaterials definitions		Report, Test (written or computer based)
W2	Students know and understand the principles of requirements of a biomaterial used for medical applications		Report, Test (written or computer based)
W3	Students understand the advance therapeutics and the concept of tissue engineering		Report, Test (written or computer based)
Skills – Student can:			
U1	Students perform experiments on the biocompatibility of selected biomaterials using in vitro and in ovo model		Report, Test (written or computer based)
U2	Students perform and plan experiments on the material characterization		Report, Test (written or computer based)
U3	Students design experiments with new biomaterials		Report, Test (written or computer based)
Social competences – Student is ready to:			
K1	Students can combine theoretical and practical knowledge		Assessment of activity during classes
K2	Students are ready to use his/her knowledge and skills in further stages of education		Assessment of activity during classes

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	The principles in field of materials science, cell biology, cellular interactions with biomaterials, methods for biomaterials surface characterization, analysis of corrosion, biodegradation of implants by reference to case studies. Introduction to basic concepts of Biomaterials Science. Lecture: Manufacturing and properties of metals, ceramics, polymers, composites and nanocomposites. Lecture and laboratory practice Assessment of biocompatibility of biomaterials . Lecture and laboratory practice. Host Responses to Biomaterials. Lecture and laboratory practice.	W1, W2, W3, U1, U2, U3, K1, K2	Lecture, Laboratory exercises, Seminar exercises

Course advanced

Activities	Methods of conducting classes
Lecture	Conversation lecture
Laboratory exercises	Laboratory (experiment), learning by experiment
Seminar exercises	Discussion

Activities	Examination method	Percentage
Lecture	Test (written or computer based)	50%
Laboratory exercises	Report	45%
Seminar exercises	Assessment of activity during classes	5%

Activities	Credit conditions
Lecture	>51% max points
Laboratory exercises	>51% max points
Seminar exercises	attendance to lab classes

Literature

Obligatory

1. Introduction to Biomaterials. Basic Theory with Engineering Applications. C. Mauli Agrawal, Joo L. Ong, Mark R. Cambridge University Press 978-0-521-11690-9
2. Biomaterials in Tissue Engineering and Regenerative Medicine: From Basic Concepts to State of the Art Approaches 9811600015, 9789811600012
3. Heng, Paul WS. "Controlled release drug delivery systems." Pharmaceutical Development and Technology 23.9 (2018): 833-833.

Optional

1. Siepmann, J., Siegel, R. A., & Rathbone, M. J. (2012). Fundamentals and applications of controlled release drug delivery (Vol. 3, pp. 33-34). New York: Springer.
2. Ratner, B. D., & Bryant, S. J. (2004). Biomaterials: where we have been and where we are going. Annu. Rev. Biomed. Eng., 6, 41-75.
3. Peppas, N. A., & Langer, R. (1994). New challenges in biomaterials. Science, 263(5154), 1715-1720.
4. Ratner, B. D., Hoffman, A. S., Schoen, F. J., & Lemons, J. E. (2004). Biomaterials science: an introduction to materials in medicine. Elsevier.
5. Omidi, M., Fatehinya, A., Farahani, M., Akbari, Z., Shahmoradi, S., Yazdian, F., ... & Vashaee, D. (2017). Characterization of biomaterials. In Biomaterials for oral and dental tissue engineering (pp. 97-115). Woodhead Publishing.

Calculation of ECTS points

Activity form	**Activity hours***
Lecture	15
Laboratory exercises	24
Seminar exercises	6
Preparing the project	30
Preparation for the exam	45
Student workload	**Hours** 120
Number of ECTS points	**ECTS** 4

* hour means 45 minutes