



**Pomorski Uniwersytet Medyczny w Szczecinie**  
**SYLLABUS of the MODULE (SUBJECT)**

**General information**

Module name: <b>Biomaterials in medical and dental practice</b>	
Module type	Facultative
Faculty PMU	Medicine and Dentistry
Major	Medical and Dentistry
Specialty	-
Level of study	Long-cycle studies
Form of study	full-time/part-time
Year, semester of studies e.g. Year 1, semester (I and II)	Year 2 (semester I)
ECTS credits (incl. semester breakdown)	1
Type/s of training	Lectures, 25 hours
Form of assessment	graded assessment
Head of the Department/ Clinic, Unit	prof. dr hab. n. med. Joanna Bober <a href="mailto:jbober@pum.edu.pl">jbober@pum.edu.pl</a>
Persons conducting classes with indication of a tutor or person responsible for the module	dr n. chem. Dobrosława Stańkowska- <a href="mailto:Walczak_dobrosława.walczak@pum.edu.pl">Walczak, dobrosława.walczak@pum.edu.pl</a> dr n. med. Jolanta Szymańska-Pasternak
Department's/Clinic's/Unit's website	<a href="http://www.pum.edu.pl/wydzialy/wydzial-lekarski/katedra-biochemii-i-chemii-medycznej/zaklad-chemii-medycznej">www.pum.edu.pl/wydzialy/wydzial-lekarski/katedra-biochemii-i-chemii-medycznej/zaklad-chemii-medycznej</a>
Language	Polish/English

### Detailed information

Module/subject objectives		The basic aim of teaching the course "Biomaterials in medical and dental practice" is to familiarise students with modern materials used in medicine (metallic, ceramic, polymeric materials, carbon materials). In the course of the programme, examples of the use of synthetic materials in dentistry and other fields of medicine, e.g. surgery, ENT, orthopaedics, cardiology, ophthalmology (implants, artificial organs, materials for tissue anastomosis, surgical instruments, contact lenses, etc.) as well as in pharmacy (biomaterials as drug carriers) will be discussed. Students will gain knowledge of the latest developments in tissue engineering, they will learn about the relationship between the structure and function of biomaterials used and their biocompatibility with the living organism. They will also be introduced to in vitro and in vivo techniques of testing the usefulness of biomaterials in medicine, as well as the use of electric cardiac pacemakers and valves. The possibilities of new technologies in obtaining artificial organs such as bio-printers will also be addressed.
Prerequisite /essential requirements	Knowledge	Knowledge of biology and chemistry on the level of secondary school
	Skills	The ability to learn independently in a targeted manner
	Competences	Demonstrates the habit of self-education:

Description of learning outcomes for the module (subject)			
No. of learning outcome	Student, who has passed the (subject)	Symbol (Referring to) Assumed Learning Outcomes	Means of verification of learning outcomes*
W01	demonstrates knowledge of human body structures: cells, tissues and systems with particular regard to stomatognathic system	K_A.W01	An assessment on the basis of documented attendance at lectures
W02	know the importance of the main and trace elements in the processes occurring in the organism including supply, absorption and transport;	K_B.W01	
W03	knows biochemical bases of human body integrity	K_B.W03	
W04	knows and understands principles of calcium-phosphate metabolism	K_B.W05	
W05	knows the role and importance of body fluids including saliva	K_B.W06	
W06	knows the mechanics of the masticatory organ	K_B.W08	

W07	knows the principles of photometry, optical fibre and use of light sources in dentistry	K_B.W11	
W08	knows and discusses mechanisms of inflammatory reaction and wound healing,	K_C.W14	

W09	knows the definition and classification of basic and auxiliary dental materials	K_C.W24	
W010	knows the composition, structure, way of bonding, properties and purpose and use of dental materials	K_C.W25	
W011	knows and describes surface properties of dental hard tissues and dental biomaterials	K_C.W26	
W012	defines the phenomenon of adhesion and mechanisms of producing an adhesive bond and procedures of adhesive preparation of enamel adhesive preparation of enamel, dentine and dental biomaterials surfaces	K_C.W27	
W013	knows basic clinical procedures of dental hard tissue reconstruction and endodontic treatment as well as methods and technical-laboratory procedures for fabrication of prosthetic restorations	K_C.W28	An assessment on the basis of documented attendance at lectures
W014	knows mechanisms of degradation (corrosion) of dental biomaterials in oral cavity and their influence on biological properties of materials	K_C.W29	
W015	Knows the diagnosis and treatment of parodontium and diseases of oral mucosa	K_F.W11	
W016	knows indications and contraindications as to treatment with use of dental implants	K_F.W12	
U01	is able to associate chemical phenomena with processes occurring in oral cavity	K_B.U01	
U02	is able to interpret physical phenomena occurring in stomatognathic system	K_B.U02	An assessment on the basis of documented attendance at lectures
U03	selects reconstructive, prosthetic and binding materials according to properties of materials and clinical conditions	K_C.U11	
U04	identifies correct and pathological structures and organs in additional imaging examination (X-ray, USG, computer Tomography - CT)	K_E.U05	
U05	describes pathological changes in cells tissues and organs according to basic mechanisms	K_F.U16	
K01	shows the habit of self-education and of lifelong learning	K_K01	

Table presenting LEARNING OUTCOMES in relation to the form of classes									
No.	Symbol (Referring to) Assumed Learning Outcomes	Form of didactic classes							
		Lecture	Seminar	Practical	Clinical classes	...	...	...	others ...
1.	K_A.W01	X							
2.	K_B.W02	X							
3	K_B.W03	X							
4	K_B.W05	X							
5	K_B.W06	X							
6	K_B.W08	X							
7	K_B.W11	X							
8	K_C.W14	X							
9	K_C.W24	X							
10	K_C.W25	X							
11	K_C.W26	X							
12	K_C.W27	X							
13	K_C.W28	X							
14	K_C.W29	X							
15	K_F.W11	X							
16	K_F.W12	X							
17	K_B.U01	X							
18	K_B.U02	X							
19	K_C.U11	X							
20	K_E.U05	X							
21	K_F.U16	X							

Learning content			
No. of learning content	Description of learning content- Lectures	Number of hours	Referring to learning outcomes for the module
TK01	Introduction to biomaterials science, definitions, classification of biomaterials	2	W01, W02, W03, K01
TK02	Processes occurring in the implant-organism system	2	W01, W02, W03, K01
TK03	Study of biocompatibility of biomaterials <i>in vivo</i>	2	W01, W02, W03, K01
TK04	Study of biocompatibility of biomaterials <i>in vivo</i>	2	W01, W02, W03, K01
TK05	Polymeric materials	2	W01, W02, W03, W012, K01
TK06	Pharmaceutical use of polymers	2	W01, W02, W03, W012, K01
TK07	Ceramic biomaterials and carbon composites	2	W01, W02, W03, W04, W07, K01
TK08	Metals as biomaterials	2	W06 W07 W08 W09 W014 W016, U01, U02, U03, U04, K01
TK09	Tissue anastomosis materials	2	W06, W07, W08, W09, W014 W016, U01, U02, U03, U05, K01
TK10	Tissue anastomosis materials	2	W06, W07, W08, W09, W014 W016, U01, U02, U03, U05, K01
TK11	Valves, pacemakers and others	2	W06 W07 W08 W09 W014 W016, U01, U02, U03, U05, K01
TK12	Cements, waxes, gypsum	2	W04, W05, W06, W08, W09 W014 W016, U01, U02, U03, U05, K01
TK13	Tissue engineering and regenerative medicine	1	W06 W07 W08 W09 W014 W016, U01, U02, U03, U05, K01
Booklist			
Obligatory/supplementary literature:			
1. Podstawy inżynierii biomedycznej tom 1 i 2 pod red. Tadeusiewicz R., Augustyniak P. Wydawnictwa AGH. Kraków 2009			
2. Świczko-Żurek B. Biomateriały. Skrypt Politechniki Gdańskiej. Gdańsk. 2009.			
3. Marciniak J. Biomateriały. Wydaw. Politechniki Śląskiej. Gliwice 2002.			
4. Biocybernetyka i Inżynieria Biomedyczna 2000. Tom 4. Biomateriały pod red. Nałęcz M, Błazewicz S., Stoch L. Akademicka Oficyna Wydawnicza EXIT. Warszawa 2003.			

5. Biocybernetyka i Inżynieria Biomedyczna 2000. Tom 3. Sztuczne narządy pod red.

Nałęcz M, Darowski M., Orłowski T., Weryński A., Wójcicki J. M. Akademicka Oficyna Wydawnicza EXIT. Warszawa 2001.

6. Inżynieria biomedyczna. Księga współczesnej wiedzy tajemnej w wersji przystępnej i przyjemnej pod red. Tadeusiewicz R. Uczelniane Wydawnictwa Naukowo-Dydaktyczne AGH. Kraków 2008.

**Student's workload (balance of ECTS credits)**

Form of student’s activity (in-class participation; activeness, produce a report, etc.)	Student’s workload [h]		
	Tutor .	Tutor .	Average
Contact hours with the tutor	25		
Time spent on preparation to seminars/ practical classes			
Time spent on reading recommended literature			
Time spent on writing report on Laboratory/practical classes/making project/paper etc.			
Time spent on preparing to colloquium/short test			
Time spent on preparing to exam			
Other .....			
Student’s workload in total			
ECTS credits for the module/subject	1		
Notes			

\* Selected examples of methods of assessment:

EP – written examination

EU – oral examination

ET – test examination

EPR – practical

examination K –  
colloquium

R – report

S – practical skills assessment RZĆ –

practical classes report, incl. discussion on  
results O – student's active participation and

attitude assessment SL – lab report

SL – laboratory report SP – case

study

PS - assessment of student's ability to work  
independently W – entry test PM –

multimedial presentation

and other