

**1. General information****Course:** BIOMATERIALS**Type:** ELECTIVE**Degree:** 341 - UNDERGRADUATE DEGREE PROGRAMME IN BIOCHEMISTRY**Center:** 501 - FACULTY OF ENVIRONMENTAL SCIENCES AND BIOCHEMISTRY**Year:** 4**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 13343**ECTS credits:** 4.5**Academic year:** 2022-23**Group(s):** 40**Duration:** C2**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** CAROLINA HERNANDEZ LABRADO - Group(s): 40

Building/Office	Department	Phone number	Email	Office hours
Inamol, Lab 0.5	QUÍMICA INORG., ORG., Y BIOQ.	925268800	carolina.hernandez@uclm.es	Monday and Wednesday, from 16:00-20:00 h, by appointment.

2. Pre-Requisites

Not established

3. Justification in the curriculum, relation to other subjects and to the profession

This is an introductory course covering the main aspects of biomaterial design. Special emphasis is placed on the properties of materials that determine the behavior of devices once implanted, namely, chemical nature, bulk and surface properties, manufacturing processes, testing and regulatory issues. During the second part of the term, the factors affecting the biological response of the implanted materials will also be studied.

4. Degree competences achieved in this course**Course competences**

Code	Description
E01	Express themselves correctly in basic biological, physical, chemical, mathematical and computer terms.
E14	Know how to interpret the information provided by the most common structural characterization techniques in Biochemistry and Molecular Biology.
G01	To possess and understand the knowledge in the area of Biochemistry and Molecular Biology at a level that, based on advanced textbooks, also includes cutting-edge aspects of relevance in the discipline
G02	To know how to apply the knowledge of Biochemistry and Molecular Biology to professional practice and to possess the necessary intellectual skills and abilities for this practice, including the capacity for: information management, analysis and synthesis, problem solving, organization and planning and generation of new ideas.
G03	Be able to collect and interpret relevant data, information and results, draw conclusions and issue reasoned reports on relevant social, scientific or ethical issues in connection with advances in Biochemistry and Molecular Biology.
G04	To know how to transmit information, ideas, problems and solutions in the field of Biochemistry and Molecular Biology to a specialized and non-specialized public.
G05	Develop those strategies and learning skills necessary to undertake further studies in the area of Biochemistry and Molecular Biology and other related areas with a high degree of autonomy.
G06	Acquire skills in the handling of computer programs including access to bibliographic, structural or any other type of databases useful in Biochemistry and Molecular Biology.
T01	Proficiency in a second foreign language, preferably English, at level B1 of the Common European Framework of Reference for Languages
T02	User-level knowledge of Information and Communication Technologies (ICT).
T03	A correct oral and written communication
T05	Organizational and planning skills
T06	Capacity for design, analysis and synthesis
T08	Ability to work as a team and, where appropriate, exercise leadership functions, encouraging entrepreneurship
T10	Ability to self-learn and to obtain and manage bibliographic information, including Internet resources

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

The professional profile "molecular biomedicine" includes the application of biochemistry in the health sector, so that the student receives a strong biomedical and clinical orientation and also acquires the skills to carry out a professional activity in the field of teaching and research.

In the professional profile "biotechnology", the student is oriented towards professional activity in the business and pharmaceutical fields; he or she also acquires skills to carry out a professional activity in the field of teaching and research.

6. Units / Contents**Unit 1: Properties of biomaterials****Unit 1.1** Bonding and structure

- Unit 1.2 Physical properties
- Unit 1.3 Mechanical properties
- Unit 1.4 Degradation
- Unit 1.5 Processing
- Unit 1.6 Surface properties

Unit 2: Interactions with biomaterials

- Unit 2.7 Protein interactions
- Unit 2.8 Cell interactions

Unit 3: Biomaterials implantation

- Unit 3.1 Inflammation
- Unit 3.2 Wound healing
- Unit 3.3 Immune response
- Unit 3.4 Infection, Tumorigenesis and Calcification

7. Activities, Units/Modules and Methodology							
Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]		E01 E14 G01	1.2	30	N	-	
Workshops or seminars [ON-SITE]		E01 E14 G01 G02 G06 T10	0.4	10	N	-	
Analysis of articles and reviews [OFF-SITE]		E01 E14 G01 G02 G03 G05 G06 T10	0.5	12.5	N	-	
Writing of reports or projects [OFF-SITE]		E01 E14 G01 G02 G03 G04 G05 G06 T10	0.48	12	Y	Y	
Study and Exam Preparation [OFF-SITE]		E01 E14 G01 G02 G05 G06 T10	1.72	43	N	-	
Project or Topic Presentations [ON-SITE]		E01 E14 G01 G02 G03 G04 G05 G06 T10	0.12	3	Y	Y	
Final test [ON-SITE]	Assessment tests	E01 E14 G01 G02	0.08	2	Y	Y	
Total:			4.5	112.5			
Total credits of in-class work: 1.8				Total class time hours: 45			
Total credits of out of class work: 2.7				Total hours of out of class work: 67.5			

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System			
Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Final test	70.00%	70.00%	
Assessment of problem solving and/or case studies	30.00%	30.00%	
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

The modality assigned by default to the student will be the continuous evaluation. Any student may request the change to the modality of non-continuous evaluation (before the end of the class period) by emailing the teacher, provided that he has not completed 50% of the evaluable activities.

To pass the subject one must obtain a global score equal to or greater than 5 points. This qualification will result from applying the percentages shown in the table to the different marks that will be obtained along the course.

In addition, mandatory requirement will be:

- A minimum score of 4 points in the final test.

A minimum score will not be required on the practical activities.

Non-continuous evaluation:

To pass the subject one must obtain a global score equal to or greater than 5 points. This qualification will result from applying the percentages shown in the table to the different marks that will be obtained along the course.

In addition, mandatory requirement will be:

- A minimum score of 4 points in the final test.

A minimum score will not be required on the practical activities.

Specifications for the resit/retake exam:

To pass the subject one must obtain a global score equal to or greater than 5 points. This qualification will result from applying the percentages shown in the table to the different marks that will be obtained along the course.

In addition, mandatory requirement will be:

- A minimum score of 4 points in the final test.

A minimum score will not be required on the practical activities.

Specifications for the second resit / retake exam:

A minimum score of 5 points on the final test will be mandatory to pass the subject.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	hours

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	City	ISBN	Year	Description
Ratner & Hoffman & Schoen & Lemons	Biomaterials Science: An Introduction to Materials in Medicine http://store.elsevier.com/product.jsp?isbn=9780123746269&pagename=search	Academic Press		9780123746269	2012	
Temenoff, J. S.	Biomaterials : the Intersection of biology and materials sci http://catalogue.pearsoned.co.uk/educator/product/Biomaterials-The-Intersection-of-Biology-and-Materials-Science-International-Edition/9780132350440.page#dw_resources	Pearson/Prentice Hall		0-13-009710-1	2008	
Helsen, Jozef A., Missirlis, Yannis	Biomaterials http://www.springer.com/physics/biophysics+%26+biological+physics/book/978-3-642-12531-7	Springer		978-3-642-12532-4	2010	
Joon Park, R. S. Lakes	Biomaterials: An Introduction http://www.springer.com/materials/biomaterials/book/978-0-387-37879-4	Springer		1441922814, 97814419	2010	